

WORK PROGRAMME 2011

COOPERATION

THEME 4

***NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND
NEW PRODUCTION TECHNOLOGIES - NMP***

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Objective

The principal objectives of this Theme are to improve the competitiveness of European industry and to generate knowledge to ensure its transformation from a resource-intensive to a knowledge-intensive base, by creating step changes through research and implementing decisive knowledge for new applications at the crossroads between different technologies and disciplines. This will benefit both new, high-tech industries and higher-value, knowledge-based traditional industries, with a special focus on the appropriate dissemination of RTD results to SMEs. These activities are concerned with enabling technologies which impact all industrial sectors and many other Themes of the Seventh Framework Programme.

I CONTEXT

I.1 Approach for 2011

A key feature of the 2011 Work Programme (WP) is the participation for the second year in actions within the European recovery package. Indeed, as an answer to the recent world-wide economic crisis, these pluri-annual actions launched by the EU at the end of 2008 serve the main goals of the Europe 2020 strategy for smart, sustainable and inclusive growth. The action on research and innovation mainly includes a support of innovation in manufacturing, the construction industry and the automobile sector. This is being implemented under the scheme of three initiatives of Public-Private Partnerships (PPPs), namely: "Factories of the future", "Energy-efficient buildings" and "Green cars". The objective is to promote the convergence of public interests with industrial commitment and leadership to define strategic research activities in key sectors.

The nature of industrial technologies in the NMP programme made it a very appropriate tool to address, at different degrees, the core objectives of all three PPPs, in cooperation with other Themes of the Seventh Framework Programme. The 2011 exercise of PPPs will see the involvement of the NMP Theme with 11 topics and an amount of about EUR 130 million through the adaptation of a number of RTD topics to the RTD efforts associated to the recovery package, using a higher budget than in the previous year (100 million and 6 topics).

Beyond the NMP participation in the PPP initiatives, the core objective of Theme 4 '*Nanosciences, Nanotechnologies, Materials and new Production Technologies – NMP*' remains stable, that is to fund research, development, demonstration, and coordination projects that will contribute, either on their own or by enabling further development, to **the transformation of European industry** from a resource-intensive to a **knowledge-intensive industry**, thus meeting the challenge imposed by the new industrial revolution and competition at global level, as well as environmental challenges. This transformation is essential in order to produce, in a sustainable manner, high added value products, embedding European cultural values through design and this in turn is essential not only to prevent the relocation of European industry to other areas of the world, but also create new industries, and hence growth and employment within Europe. The competitiveness of more mature industries is also largely dependent on their capacity to integrate knowledge and new technologies.

The competitiveness of European industry is promoted by **generating step changes in a wide range of sectors and implementing decisive knowledge for new applications** at the crossroads between different technologies and disciplines. Research will be focused on generating **high added-value products and related processes and technologies** to meet customer requirements as well as growth, public health, occupational safety, environmental protection, and societal values and expectations. The **sustainability** concern (balance in economic growth, social well-being and environmental protection) resides at the centre of any industrial RTD development. Environmental challenges such as climate change and resources scarcity are the sources of both constraints and opportunities for technological developments.

Furthermore, during the last few years, much effort has been spent by the stakeholders within the European Technology Platforms (ETPs) around the definition of strategic research in about 30 EU sectors. Due to its multisectoral nature, the NMP Theme is the most concerned by the ETPs. Integrating the long-term vision that industry itself provides will greatly enhance the effectiveness of RTD related to long-term challenges, also allowing benefits for additional sectors and other stakeholders to be included, through the development of generic technologies. A key issue will be to integrate competitiveness, innovation and sustainability into the NMP related research activities as well as initiatives capable of fostering the dialogue with society at large, together with education and skills development.

The NMP work programme 2011 is characterised by a higher budget: more than EUR 300 million for the NMP activities, compared to 198 million in 2010; this is in addition to the amount of EUR 130 million for PPPs mentioned above. The number of topics in the core NMP 2011 work programme is thus higher: 35 topics compared to 22 topics in the previous year. These topics are proposed on the basis of the NMP multiannual strategy as defined in the Framework Programme and the Specific Programme Decisions, as well as on the NMP project portfolio: the research activities proposed for 2011 either address topics not yet covered or topics complementary to previous work programmes. The international dimension remains an important aspect of the NMP work programme 2011.

In ensuring continuity with previous programmes and calls, NMP has evolved on the basis of the acquired experience, of the challenges imposed by the needs of European industry as well as of the its projects' portfolio. It is clear that with this very wide applicability, selective choices will have to be made as the Theme evolves over the duration of the Framework Programme and to address emerging scientific and societal issues as well as new technological challenges. The strategic approach is strongly focused on demonstrable added value in EU industry arising from a proper appreciation of the potential of nanotechnologies, materials and production technologies. It will be essential to ensure the uptake of knowledge generated through effective dissemination and use of the results.

Theme 4 is structured as follows:

a) Three thematic activities:

- **Nanosciences and Nanotechnologies** activity in 2011 consists of 13 RTD topics and provides support to research and innovation in (i) sustainability, energy and health challenges by addressing: multifunctional packaging concepts, up-scaling of innovative photovoltaic cell processes, targeted therapy using macro-molecules, nanomembranes for efficient water treatment; (ii) ensuring the safety of nanotechnology with topics on: measuring, detection and identification of nanoparticles, worker protection and exposure risk management, testing strategies for nanomaterials impact and exposure and development of a European platform on nano outreach and dialogue; (iii) cross-cutting and enabling RTD by addressing: large-scale green and economical synthesis of nanoparticles and nanostructures, nano-scale detection and control techniques for large area substrates, imaging structures and composition at the nanometre scale, implantable and interfaceable devices and multiscale modelling for virtual nanotechnology experimentation.

- **Materials** in 2011 will focus on 12 RTD topics, spread at 3 different levels: (i) Enabling RTD with topics on: advanced multifunctional ceramic materials, modelling of ultrafast dynamics in materials; (ii) Innovative materials for advanced applications addressed through topics on: superconducting materials for electro-technical applications, tissue engineering for age-related cancer and sensory organ diseases, solid state lighting, replacing critical materials, new materials and techniques for applications on cultural heritage assets, fundamental properties of novel superconducting materials and (iii) on structuring actions with topics being: advanced packaging materials from renewable biogenic resources, one ERA-NET (international actions on materials research) and a coordinating action on networking materials laboratories.

- **New Production Technologies** is the NMP RTD area that was called to largely contribute with the initially designed NMP topics to the recovery package PPPs, namely those of "Factories of the future" and "Energy-efficient buildings". The three topics that are contained within the NMP programme *per se* handle very specific issues, namely: eco-design for new products, modelling and control of intensified process systems and eco-efficient management of industrial water.

b) **Integration**, a fourth activity, aims at developing new applications and new approaches in different industrial sectors by combining research from the first three activities. This is a '*deliverables-driven*' integration to generate high added value products, with particular - but not exclusive - reference to industrial and regulatory needs and challenges identified by the European Technology Platforms. For 2011, the focus is on physical processing of materials for mechanical or electro-technical applications, technologies for intelligent mining, and textiles for the energy and environmental protection markets. Finally, two ERA-NETs are foreseen (on industrial handling of raw materials and on industrial safety) as well as three supporting actions: networks of excellence with durable integrated structures, organisation of events related to the Presidencies of the European Union and NCP trans-national activities.

I.2 Research relevant for SMEs

The NMP Theme is particularly relevant to SMEs from within all industrial sectors due to their needs and roles with respect to advanced technologies. SMEs can participate in each and every call for proposals implemented by the NMP Theme. Moreover, **dedicated calls for Collaborative Projects targeted to SMEs** are implemented with the aim of reinforcing their scientific and technological base and of validating innovative solutions. Priority will be given to proposals demonstrating that SMEs play a leading role and that they represent in the order of 35% or more of the requested EU contribution.

I.3 International Cooperation

The increasingly important international dimension of industrial research requires a well-coordinated approach to working with third countries and in international forums, in particular where there is evident mutual benefit, either in terms of excellence of the research and/or in terms of an increased impact. Some topics have been specifically highlighted as being research areas which are particularly well suited for international cooperation. In addition, specific actions may include:

- coordinated calls to address objectives of mutual interest (for example with countries having signed an S&T cooperation agreement);
- specific initiatives (such as technical workshops and similar events, in particular in the fields of materials sciences and nanomaterials, in order to identify topics of mutual interest for future coordinated calls and/or for Specific International Cooperation Actions - SICAs¹) to promote the participation of emerging economies and developing countries (see Annex 1 – International Cooperation Partner Countries - ICPC);
- the Intelligent Manufacturing Systems (IMS) scheme²;
- the development of internationally harmonised standards and nomenclature;
- dialogues with major countries on a '*code of conduct*' for the responsible and safe development

¹ SICA are Collaborative Projects where the consortia must include at least four independent legal entities of which at least two must be established in different Member States or Associated countries and at least two must be established in different ICPC countries (Art. 7 of the Regulation 1906/2006 of the European Parliament and of the Council, laying down the rules for the participation of undertakings, research centres and universities).

² For more information on IMS: <http://cordis.europa.eu/ims>. The European Union participates according to Article 108(2)(d) of the Financial Regulation.

of nanotechnology;

- coordinated actions with researchers in other world regions.

Initiatives to coordinate and exchange research data are encouraged (such as in the environmental, safety and health issues for nanotechnologies), paving the way for a common understanding of regulatory needs by policy makers across the world.

Cooperation with Latin America and the Caribbean

The 2010 EU-Latin America and Caribbean (LAC) Summit³ focused on bi-regional cooperation on "Innovation and technology for sustainable development and social inclusion". The Summit's Action Plan calls for boosting science and technology cooperation between the EU and LAC countries. The planned WP activities targeting LAC should contribute to sustainability as advocated by the Summit. This requires an integrated approach taking into account the environmental, economic and social dimensions and a balanced involvement of research teams and the relevant stakeholders from Europe and the LAC region in the consortia. Special attention will be paid to the uptake and use of the new knowledge generated and, whenever relevant, to SME participation.

Where appropriate, synergies and/or complementarities among projects selected from the LAC focused topics are encouraged within the same theme or across themes. In these cases, a dedicated budget for coordination or joint outreach activities could be foreseen. For information on LAC related topics in other themes, see the corresponding work programme chapters⁴. The topic considered under this specific geographical focus in Theme 'Nanosciences, Nanotechnologies, Materials and New Production Technologies' is:

NMP.2011.2.3-1 Advanced packaging materials from renewable biogenic resources (focus: Latin America)

I.4 Cross-thematic approaches and coordination with National and regional activities

The cross-sectoral nature of NMP requires close attention and cooperation with nearly all other Themes of the Seventh Framework Programme: Health, Food, Security, Space, ICT, Energy, Environment and Transport. Cross-thematic areas are addressed through **calls** implemented **jointly** with other Themes, thus ensuring that the same objectives are achieved; and through **calls coordinated** with other Themes to achieve complementary objectives. Specific actions to **coordinate programmes and joint activities** conducted at national and regional level will also be carried out through *ad hoc* schemes (in particular ERANET and ERANET-*plus*) so as to promote convergence of research programmes and to reinforce critical mass. Coordination will also be encouraged in areas such as metrology, toxicology, standards and nomenclature, for example, to foster synergies within and between the emerging ETPs (European Technology Platforms), as well as with other schemes such as COST and Eureka.

I.5 Theme specific information

The work programme 2011 introduces each area and gives a description of the topics for which project proposals are invited. For each topic, the work programme specifies which funding scheme is to be used:

- **Collaborative Projects:** *Small or medium scale focused research projects* and *Large scale integrating projects* (which may include additional activities such as demonstration, innovation-related activities, education and training) are implemented via separate calls. For each funding

³ Madrid, 18-19 May 2010. See also ec.europa.eu/research/inco – Latin America and Caribbean

⁴ 'Health', 'Food, Agriculture, Fisheries and Biotechnology' (KBBE), 'Information and Communication Technologies', 'Nanosciences, Nanotechnologies, Materials and New Production Technologies' (NMP), 'Environment (including climate change)', 'Transport (including aeronautics)' and 'Social Sciences and Humanities'.

scheme there are upper and lower limits respectively on the requested EU contribution as specified in Section III, Implementation of Calls. **It is important to note that these funding limits are applied as additional eligibility criteria.**

- **Coordination and Support Actions** may relate to coordination, networking or supporting activities at European and international, national or regional level. The organisation of events, studies, where relevant, organisation and management of joint or common initiatives may be included, as well as activities aimed at supporting the implementation of the Theme, such as dissemination, information and communication and activities to stimulate and encourage the participation of civil society organisations.

The forms of the grant to be used for the funding schemes in this part of the work programme are stated in Annex 3.

NMP focuses on a wide range of industrial sectors and on a wide range of RTD domains.

- The **range of industrial sectors** evidently covers those key sectors which concern industrial production, such as manufacturing and chemical processing, but it also extends to traditional sectors (construction, textiles, etc), which are moving up the high-technology innovation stream, and to other sectors striving to maintain and increase their leading position within the EU (electronics, photonics, medical equipment, etc.). Manufacturing and Construction have been specifically and particularly addressed through the PPP initiatives.
- The **RTD domains** addressing the RTD challenges for a strategic industrial transformation range from (a) nanosciences and nanotechnologies that are becoming one of the new paradigms and enabling factors across virtually all fields of science and technology, to (b) materials that are rapidly acquiring the knowledge-based features, to (c) the products/production-related technologies that are pushing towards the 'factory of the future', something that will strongly underpin the revolution that is needed, as it is was illustrated by the emergence of the "Factories of the future" PPP initiative within the recent EU recovery package.

Industrial involvement is crucial in order to safeguard the industrial relevance of the activities supported in the NMP Theme. Direct industrial participation as partners in projects is encouraged across all topics of the NMP Theme.

The description of each topic, in addition to the technical content and scope, includes any participation requirements (such as industrial participation, where appropriate) as well as related expected impact(s) for the topic.

The **submission** and **evaluation** of proposals for Collaborative Projects (including those dedicated to SMEs) will be organised in **two stages**. The rationale for this is due to the specific nature of Theme 4 – NMP, which is multidisciplinary, cross-sectoral and SME intensive, and for which a 'bottom-up' approach is encouraged. On the other hand, the calls for the PPP initiatives will adopt a single-stage scheme to accelerate the process within this urgent recovery plan.

The first stage proposal should focus on the S&T content and on clear identification of the intended results, their intended use, and the expected impact (economic, social, environmental etc). It will be evaluated on the basis of two criteria: **scientific quality** and expected **impact**. Coordinators of retained proposals in stage 1 will be invited to submit a complete proposal that will then be evaluated against the entire set of evaluation criteria.

Participation of women in research and gender dimension

The pursuit of excellence in scientific knowledge and in its technical application towards socially acceptable products, processes and services requires greater inclusiveness of a diversity of perspectives. In particular the overall process of transforming European industry will not be achieved without the talent, perspectives and insights that can be added by a more balanced participation of women and the integration of gender issues in RTD activities.

Increasing the diversity of perspectives particularly (but not exclusively) to gender issues at the level of the NMP objectives and topics may have a particular relevance in areas such as new business and organisational models, increasing the level of comfort and user friendliness provided by materials and industrial products, improved understanding of toxicity and risk and in all areas where industrial technologies research is aimed at medical application (e.g. nanomedicine - diagnostics, drug delivery or regenerative medicine). The NMP Theme is committed to undertake specific measures to ensure practical uptakes of this issue together with industry.

II. Content of Calls

II.1. Activity 4.1 Nanosciences and Nanotechnologies

Nanosciences and nanotechnologies research, development and innovation are governed by an *integrated, safe and responsible policy framework*⁵. This development strategy is being implemented through a wide range of activities whose purpose it is to ensure that development and deployment of nanotechnology are carried out in a way that takes people's expectations and concerns into account, especially as regards human and environmental safety.

Sales forecasts for products incorporating nanotechnology range from \$ 1 trillion to \$ 3 trillion by 2015. Current sales figures are still some way away from these figures, but the growth trend is following the projections. Indeed, nanotechnology research results have started to migrate from the confines of the laboratory towards real applications in various industrial sectors.

Societal, governance and health-safety-environment related issues must seamlessly accompany the development of industrial applications. Research must be complemented by, and provide support to a careful review of the regulatory landscape, reflections on ethical issues and outreach.

This is reflected in the revised WP structure, highlighting four areas of emphasis for nanosciences and nanotechnologies: *Maximising the contribution of nanotechnology on sustainable development; Nanotechnology for benefiting Environment, Energy and Health; Ensuring safety of nanotechnology; and Cross-cutting and enabling R&D.*

During the second half of FP7, the implementation is characterised by a gradual shift from fundamental research towards more application-oriented research. Faster introduction of nano-based applications into markets contributes to innovation-led competitiveness for European industry as well as provides significant societal and economic benefits.

In this context, the significant public investment made in nanotechnology research must provide a return to society in terms of contributing towards solutions to major societal challenges. Nanotechnology has significant potential to improve sustainability and to become a source of innovation in many industrial sectors.

The aim is, therefore, to cover important European Technology Platform related priorities, e.g. in chemistry, construction, textile, fibres and forest based industries, transport and agro-food related sectors, with nanotechnology as the key enabling technology. Further, Energy, Environment and Healthcare are at the forefront of global challenges, and of concern to every citizen. Notwithstanding the significant economic potential of environmental, energy and health technologies, nanotechnology must stand in the forefront for providing solutions.

In the light of available scientific evidence and public concerns associated with the potential risks of nanotechnologies and their applications, **scientific investigators are strongly encouraged to pay renewed attention to safety** – the safety of workers, the public and the environment. This Work Programme stresses not only the necessity to consider safety aspects from the beginning and the desirability of inherently safe design, but also requires that projects include a full scientific risk assessment as well as proposals for risk mitigation measures, where appropriate.

Although safety is an integral part of all application related research, there is also a need for a more concerted approach. In specific nanosafety related research, the emphasis of the NMP theme is shifting from toxicology studies of individual nanomaterials towards more holistic safety assessment and management that manages overall risks. Agreed methods, techniques, equipment

⁵ Nanosciences and Nanotechnologies :An action plan for Europe2005-2009

for toxicity studies, occupational exposure assessment and for risk reduction and mitigation will be an important part of this work.

As material systems and device structures become nanosized and nanostructured, significant challenges exist related to design and growth of these structures in a precise and reproducible manner. The analysis of their three-dimensional structure, properties and functions with a high level of precision poses another challenge. Detailed knowledge of e.g. the chemical, electronic and magnetic properties of nanomaterials is a pre-requisite for being able to tailor their functions in a controlled way. In the face of these challenges, the development of a wider range of nano-enabled applications requires continued significant R&D support in cross-cutting areas and technologies, such as instrumentation, characterisation, modelling and design.

II.1.1 Maximising the contribution of Nanotechnology to sustainable development

The potential contribution to sustainable development makes nanotechnology one of the key enabling technologies. This activity will give priority to potential applications incorporating nanotechnology in various industrial sectors which have a significant potential to improve sustainability e.g. in terms of material, energy or process efficiency, industrial productivity in addition to contributing industrial competitiveness and bringing benefits to consumers. The uptake of nanotechnologies in existing industrial sectors, while addressing unintended consequences, is expected to promote a step change in industrial performance and possibly leading to totally new production-consumption patterns or manufacturing processes.

Wherever appropriate, an interdisciplinary approach integrating different technologies, sciences or disciplines should be considered. This includes health, safety and environmental issues from life-cycle perspective as well as modelling, nomenclature, metrology and standardisation.

NMP.2011.1.1-1 Smart and multifunctional packaging concepts utilizing nanotechnology

Technical content/scope: It is essential that future developments in the packaging industry reflect the society's needs on responsible energy and resource management with a clear demonstration of sustainability. For example, fibre based materials have extensive potential in replacement of less sustainable materials, such as glass and metal in packaging. However, the industry must also find new ways of adding value to its products. The focus of the topic is to develop smart and multifunctional packaging concepts utilising nanotechnology and exhibiting the following properties:

- superb barrier properties in terms of durability and protection capabilities utilizing e.g. nanocoatings or thin films for enhancing consumer safety and to extend the shelf life of packaged, perishable goods;
- smart features incorporating nanotechnology such as indicators, sensors, protection against counterfeit and tampering, product traceability indicators, interactive components or biometric components which can be added to packaging using low cost printing technologies, such as roll-to-roll printing;
- utilisation of materials derived from a sustainable and renewable source, recyclability or biodegradability, and the applicability of resource-efficient (material, energy, water) package production processes.

The proposals to this topic should emphasize the applicability of the concepts in terms of processability, applicability to the packaging value chain (from cradle to cradle), functional performance, and preferably should target end-use demonstrations. Especially solutions should aim

for safe, easily recyclable packaging materials to existing recycling chains with minimal additional steps.

Due consideration of the risks and benefits must be included and the safety of the proposed developments must be ensured for the full product life cycle (production, use, disposal/recycling). The cost (including material and energy efficiency) and technical performance of the proposed solutions must also be assessed. Applications where food comes into direct contact with surfaces incorporating nanomaterials should be avoided.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impact: In terms of technology development, to demonstrate the viability and benefits of smart and multifunctional packaging concepts capable of enhancing environmental sustainability of packaging business and contributing to low-carbon economy. In particular, to meet the demands on packaging recyclability and raw material based on renewable sources. To promote the creation of markets for products and processes utilising smart and multifunctional packaging concepts, thus boosting the competitiveness of the European packaging industry and contributing to growth and jobs. Provide tangible benefits to consumers in terms of improved performance, safety and security of products and management of domestic waste.

II.1.2 Nanotechnology for benefiting environment, energy and health

Nanotechnology is an evolving technology which can significantly contribute to raising living standards and improving the quality of life. Many promising applications and products have been identified in the fields of environmental protection, energy efficiency, and healthcare and many more applications are expected in the future. Nanotechnology offers a potential "win-win" opportunity for both meeting the most urgent societal challenges while contributing to the transition towards an eco-efficient economy and innovation-led growth. However, this potential is as of yet far from full realisation – and in many cases, the viability of industrial-scale applications needs to be verified in a way that replaces established industrial products and practices.

The main objective of this activity is to support the development of nanotechnologies that can benefit the environment, energy and health while addressing unintended consequences. Industrial innovation is promoted by developing nanotechnologies that will enable both the manufacturing of new, higher performance 'nano-enabled' services, products, components, devices and systems across a range of applications, e.g. water purification, innovative photovoltaics and new therapeutics using nanotechnology. Whenever appropriate, an interdisciplinary approach integrating different technologies, sciences or disciplines should be considered. This includes health, safety and environmental issues from life-cycle perspective as well as modelling, nomenclature, metrology and standardisation.

NMP.2011.1.2-1 Development and up-scaling of innovative photovoltaic cell processes and architectures to pilot-line scale for industrial application – call jointly implemented with ENERGY

Technical content/scope: Europe is by far the first worldwide market for photovoltaics and is also strongly involved in both innovation and industrial applications in the field. Nevertheless, in order to achieve costs below 1€/Wp, which is required for Grid-parity for photovoltaics, an intensive and

constant R&D support is required. Novel cell architectures and new processes should be developed and transferred as fast as possible into industrial applications.

One main challenge in the field is to bring e.g. nanotechnology know-how developed at laboratory scale to industry. Typically, photovoltaic industries use production lines with very large machinery with a continuous flow and are not flexible to implement new ideas. The projects shall be focused on the scale-up of innovative and laboratory-scale photovoltaic (PV) cell processes to pilot-line-scale for industrial application. Device, process and equipment optimisation to target very high cell and module efficiency, high production throughput have to be considered at the same time. Individual proposals shall address one of the following two baseline processes:

- Innovative thin film processes based on inorganic nanostructured materials deposited on glass, metal sheets or polymers, with new cell configurations obtained through innovative methods, such as PVD, printing, or other.
- Innovative wafer-based silicon processes exploiting new cell architectures and new approaches, such as heterojunctions, rear contact cells, metal wrap through, or other.

This topic contributes to realising the Implementation Plan (2010-2012) and the Technology Roadmap (2010-2020) of the Solar Europe Industrial Initiative and funded projects will form part of the EII.

Organic PV and Concentrating PV (CPV) will not be addressed by this call topic. In particular, CPV will be covered by topic ENERGY.2011.2.1-3. Reducing the environmental impact and cost of the fabrication, taking into account safety issues, and at the same time improving the efficiency of the technology, is a key objective. The proposals shall include a detailed impact analysis of the potential industrial take-up of the new technologies developed in terms of production and market parameters. In particular, a cost analysis for a commercial production plant with annual production of 500 MW for the proposed technologies must be included.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected impact: (i) Solutions going well beyond the state-of-the-art in terms of cost (target of far below 1 €/Wp) and efficiency; (ii) Stimulation and acceleration of the industrial take-up of promising results beyond laboratory scale; (iii) New competitive industrial processes.

Additional information: In the framework of the EII, a specific monitoring and knowledge sharing mechanism will be established under the auspices of the Commission and selected projects will be requested to participate.

NMP.2011.1.2-2 New targeted therapy using nanotechnology for transport of macromolecules across biological barriers

Technical content/scope: Nanomedicine and Nanopharmaceuticals are an emerging sector which offers potential for radical improvements in the treatment of difficult diseases with important benefits for patients by providing highly specific targeted drugs with lower side effects. One area identified as being crucial for breakthrough is the area of nano-encapsulation or nano-delivery systems. These systems have to be able to provide a significant payload and must be capable of efficiently and selectively being transported through biological barriers and must be capable of releasing the active agent in a controlled manner at the location of the disease so as to reduce the side effects in the patient. Ultimately, therapeutic delivery systems should be biocompatible, inexpensive, manufacturable, stable to store and acceptable to regulators.

At the focus of this call topic is the challenge to develop:

- technologies that promote the application of therapeutically significant payloads of higher molecular weight (>1kDa) pharmaceuticals across complex biological barriers aided by nanotechnology and exhibiting transport rates in such a way that a therapy can be effective. Examples of such biological barriers are blood-brain-barrier, mucosal barriers (e.g., intestinal, nasal, ocular, pulmonary) and epithelial skin barrier. The choice of therapeutic entity should include larger molecules such as proteins, antibodies, nucleic acids or peptide mimics, foldamers.
- a key objective would be to produce a comprehensive pre-clinical package which includes pre-clinical screening and decision making tools to demonstrate the potential for translation of the nanotechnology into the creation of diagnostic and therapeutic products.

The research projects cannot include clinical testing but may include animal testing, applying the 3 R's principle (replacement, reduction, refinement). The potential for transfer of the developed technologies to clinical practice is very important taking into account current regulatory barriers. Therefore the active participation of industrial partners and clinicians represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. The primary objective is to demonstrate a balance between efficacy and toxicity of the system with the aim of increasing benefit to risk ratio.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impact: Nanomedicine will offer the possibility for new therapeutic modalities with radical improvements for treatment of difficult diseases and benefits for the patients. At the same time, it offers opportunities for the pharmaceutical industry to innovate and change more radically to face strong global competition. Nanomedicines will be a key component as companies try to expand the established markets for macromolecule based therapeutics. In summary, the expected impacts are: (i) radical improvement of therapy; (ii) improvement of the competitiveness of the European healthcare industry; (iii) increase the application of nanotechnology in medicine; (iv) improved understanding by academics and research organizations of the requirements of the pharmaceutical industry and regulators.

NMP.2011.1.2-3 Active nanomembranes/-filters/-adsorbents for efficient water treatment with stable or regenerable low-fouling surfaces

Technical content/scope: Water is an essential natural resource in industrialised countries and in the developing world. Various techniques for water treatment are available, some of them involving nanotechnology in membranes/filters/adsorbents. An optimal barrier layer must be sufficiently dense, i.e. free of defects and larger pores. Key issues regarding performance of the barriers are the pore size and distribution, flux rate, good selectivity and long term stability, the energy/pressure needed for filtering and the usability time before membrane cleaning is necessary (fouling). Various nanoporous filters and membranes have been developed based on different material combinations (ceramics, zeolites, polymers, hybrid materials, carbon-nanotube based membranes “nanomesh”, nanowebs using nanofibers etc.). Nevertheless, so far the challenges posed by low energy needs, control of pore size and distribution and low fouling tendency have not been solved at a scale required for wide utilisation of the technology.

In order to generate stable nanofilters, the pore structures have to be controlled very carefully even on a molecular level especially when using polymer based membranes. The problem of keeping the pores free from unwanted material can be solved by applying a rational nanoscale design of the filtering membranes. This includes the generation of membranes that could be regenerated in situ in the reactor and the use of materials/particles with catalytic functions for decomposition of waste. This would not only lead to improved performance but also to less amount of waste material which has to be deposited separately.

Thus, the key R&D objectives can be summarised as:

- Modelling, rational design and development of innovative tailored Nanostructured membrane/-filter/-adsorbents materials with high hydraulic permeability, high selectivity, low-fouling and enhanced stability (organic, inorganic or hybrid materials);
- Development of robust processes for processing and up scaling of nanostructured membranes/-filters/-adsorbents;
- Demonstration of water treatment modules with new and enhanced materials in relevant separation processes.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Key objectives include: due consideration of the risks and benefits of the proposed solution must be ensured for the full product lifecycle (production, use, disposal/recycling); assessment of the cost (including material and energy efficiency) and technical performance of the proposed solutions; verified measures for preventing the occurrence of nanoparticles in treated water.

Funding Scheme: Small or medium-scale focused research projects.

Expected impact: Overall, positive contribution to one of the main global societal issues – access to safe and pure water. Improved performance of water purification processes:

- i. in industrialized countries the removal of toxins (drugs, antibiotics), pesticides and fertilizers is of increasing importance, in developing countries the removal of bacteria etc. in order to generate drinking water by on-site treatment is crucial;
- ii. potential to recover valuable materials (e.g. noble metals) in industrial processes;
- iii. improvement in the energy efficiency and usability of high performance water treatment systems;
- iv. Improvement of the competitiveness of the European environmental technologies industry in this important growth market (e.g. German water treatment equipment exports in 2006 were 13 billion € the market for micro/nanofiltration is expected to grow 10% annually).

II.1.3 Ensuring the safety of Nanotechnology

Nanotechnologies applications will substantially improve performance of many products through the unique properties of engineered nanoparticles. The same properties raise questions and generate concerns with regard to their potentially associated health and safety risks. To support safe development of nanotechnologies these risks ought to be managed through identification of the hazard, knowledge of the potential adverse effects, measurement and control of the exposure. Risk management should become an integral part of culture of the organisations involved in the supply chain. The objective is to support methods, techniques, equipment for occupational exposure assessment and for risk reduction and mitigation and their demonstration. The environmental fate and end-of-life treatment of products and waste containing nanomaterials is also of prime importance.

A key factor of success is the capacity to detect and measure engineered nanoparticles presence, mass, number and surface area and be able to distinguish from naturally occurring ones. These activities in combination with the projects that have been recently launched, with EU, EU-national and international funding, for addressing the knowledge gaps on adverse effects on health and

environment will provide a good basis for risk management in industry and research facilities. A second objective is to prepare an "intelligent testing" strategy to be applied for future toxicity testing of engineered nanoparticles. The variety of forms, functionalisation, and toxicity end-points necessitate a consistent strategy streamlined with similar efforts running globally.

NMP.2011.1.3-1 New methods for measuring, detection and identification of nanoparticles in products and/or in the environment

Technical content/scope: Key challenges in the safety evaluation of engineered nanoparticles (ENPs) include the difficulties to detect, identify and quantify engineered nanoparticles in complex matrices, such as products, food, the environment and *in situ* in biota. Projects under this topic will focus on the development of innovative, cost-effective techniques and equipment for the identification, detection and measurement of engineered nanomaterials in these complex matrices. Several different approaches to this goal can be considered:

- Development of on-line systems to identify ENPs in gaseous mixtures, exploiting all forms of specific or non-specific recognition;
- Development of new protocols for the isolation of ENPs present at high dilution in products, or requiring their isolation from a large mass of non-nanosized material;
- Development of innovative methods endowed with hypersensitive detection limits (magnetic, optical, biochemical) and approaches to ENP barcoding (e.g. radioisotopic barcodes) which can be applied to determination of whole life cycle assessments of ENP fate and behaviour;

The envisaged methods which have been developed should be suitable for characterisation and classification of ENPs for the future implementation of quantitative structure-activity relationship studies.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the leading role of SMEs with R&D capacities will be evaluated under the criteria 'Implementation' and 'Impact': the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management; and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

The active participation of relevant partners from outside the EU should add to the scientific and/or technological excellence of the project and/or lead to an increased impact of the research to be undertaken; this will be considered by the evaluators.

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criterion: An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.

Expected impact: The research should result in innovative, practically implementable and cost effective measurement approaches for the identification, detection and quantification of ENPs *in situ* in products as well as complex biological milieu, providing for next-generation approaches to nanosafety evaluation and enabling complete risk assessment of ENP based on actual detected concentrations under various exposure scenarios. For maximising their impact, funded projects will be expected to establish synergy with the EU nano-safety Infrastructure⁶, to contribute to the advancement of the EU nano-safety cluster⁷ goals and agenda, to facilitate research cohesion

⁶ proposal Qnano [currently under negotiation]

⁷ The cluster officially includes the running EU projects: ENPRA, INLIVETOX, ENNSATOX, NEPHH, HINAMOX, NANEX, NANOHOUSE, NANOFATE, NEURONANO, NANOMMUNE, NANODEVICE, NANORETOX, NANOSUSTAIN, NANOPOLYTOX, NANOLYSE, NANOTEST, NHECD. Information is available <http://cordis.europa.eu/nanotechnology/src/safety.htm> and <http://www.nanosafetycluster.eu/>.

and integration in this area. This will be reflected in the evaluation of the proposal potential impact. The necessary resources and tasks are also expected to be foreseen in the proposals.

NMP.2011.1.3-2 Worker protection and exposure risk management strategies for nanomaterial production, use and disposal

Technical content/scope: The number of products involving nanotechnology is steadily increasing in the market place. Consequently, the number of workers dealing with the production or handling of nanomaterials is also on the rise. As is the case with any kind of industrial activity, nanotechnology workers must be guaranteed a safe working environment. Thus, proposals under this topic should be focussed on consistent and integrated strategies for mitigation of the risk of workers dealing with nanomaterials as additives or part of processing steps in manufacturing, and should include all relevant worker exposure scenarios related to nanomaterial production, use and disposal.

Proposals should be focussed on integration of:

1. Nanomaterial design options to reduce hazard and/or (accidental) exposure emission potential by e.g.:
 - development of novel methods for reducing worker exposure through deepening the knowledge of the principles which drive the formation of stable aggregates of larger, less risk-posing dimensions;
 - development of appropriate methods aiming at risk remediation e.g. by imparting or increasing the tunable (e.g. via physico-chemical switches) aggregation of nanomaterials, thereby leading to the formation of less risk-posing species, also through the use of intervening molecules or treatments;
 - development of innovative methods for removing nanoparticles from the environment/workplace through exploiting specific nanomaterial (magnetic, optical, electrical, electrochemical, physical) properties should be addressed.
2. Assessment of the effectiveness of existing technical and management exposure reduction protocols and –strategies, e.g.:
 - control banding/ filtration / personnel protective equipment etc. by determination the levels of exposure for workers who are currently exposed when handling nanomaterials across the various industry sectors and different scales of industry.
3. Evaluating of current (occasional and accidental) exposure risk management strategies, e.g. confinement of processes:
 - on the level of exposure by exposure analysis by evaluating the effect of ‘Good Practices’ on exposure levels;
 - on the level of health impact by future evaluation e.g. health impact assessment by exploring possibilities to establish exposed worker cohorts and epidemiological studies related to well identified exposure scenarios

An important aspect of the work will be the consideration of nanoparticles in real conditions, e.g. as components of complex mixtures – and the interaction of nanoparticles with surrounding chemicals and other processing chemicals at all stages of nanomaterials production, use and disposal. This is an area where the involvement of industry partners with specific processing challenges is encouraged.

In order to avoid duplication of activities, proposals should consider the activities of the OECD Working Party on Manufactured Nanomaterials, ISO-TC229, and those of other relevant initiatives.

The active participation of relevant partners from outside the EU should add to the scientific and/or technological excellence of the project and/or lead to an increased impact of the research to be undertaken; this will be considered by the evaluators.

Funding Scheme: Small or medium-scale focused research projects.

Expected impact: The research should result in practical and cost effective strategies for reduction of worker exposure to nanomaterials during all stages of nanomaterials production, use and disposal that have been tested in an industrial setting, and represent a significant advance beyond the current state-of-the-art. These strategies should be especially applicable to SMEs who do not have the resources for complete divisions dedicated to occupational exposure. For maximising their impact, funded projects will be expected to establish synergy with the EU nano-safety Infrastructure⁷, to contribute to the advancement of the EU nano-safety cluster⁸ goals and agenda, to facilitate research cohesion and integration in this area. This will be reflected in the evaluation of the proposal potential impact. The necessary resources and tasks are also expected to be foreseen in the proposals.

NMP.2011.1.3-3 Intelligent testing strategies for nanomaterials impact and exposure – towards regulation and clustering of materials

Technical content/scope: Current approaches to assessing nanomaterial safety are based either on classical toxicology approaches or on novel multiplexed assays. These approaches do not provide a comprehensive assessment due to the many unique aspects of nanomaterials, such as the transport mechanisms.

Thus, new approaches, which consider and exploit these unique aspects of nanoparticles are needed urgently. The proposals under this topic should, based on current results, prepare ground for more structured future research work concerning the interactions of nanomaterials with living systems. The proposals should target the rapid onwards development of the field by promotion of the concepts of bio-nano-interactions, that is the mediation of interactions between nanoparticles, living systems and surrounding environment (e.g. biomolecules). Particular emphasis should be placed on connecting the physico-chemical properties with the biological identity *in situ* (i.e. in various culture media), with the fate and behaviour (uptake, translocation, localisation), and functional impacts at the systems level (immunological, respiratory, reproductive, circulatory, etc.) and at the cellular level (morphological response, cell signalling pathway, DNA signalling, apoptotic/stress activated pathway, protein and genetic expression etc.).

Specific topics to be considered include:

- Development of strategies to increase the integration among stakeholders (food industry, nanomaterial manufacturers, pharma- and health-related industry) for a shared, agreed-upon risk assessment strategy and approach to conveying the appropriate, evidence-based information to the public;
- Development of a framework for future research aiming at rational grouping, through well standardized methods, of engineered nanomaterials (ENMs) according to their i) physical, ii) chemical, iii) biological identity. Likely the latter (biological identity) will be most useful in terms of predictive capacity in terms of ENM uptake, translocation, localisation and biological impacts;
- Development of a framework for future research aiming at specific grouping of ENMs according to the specific health risk they present towards the immunological, respiratory, reproductive, circulatory, etc. systems.

In order to avoid duplication of activities, proposals should consider the activities of the OECD Working Party on Manufactured Nanomaterials, ISO-TC229, and those of other relevant initiatives.

The active participation of relevant partners from outside the EU should add to the scientific and/or technological excellence of the project and/or lead to an increased impact of the research to be undertaken; this will be considered by the evaluators.

Funding scheme: Coordination and Support Actions (supporting actions).

Expected impact: The research should result in:

- i. increased integration and advancement of EU policy on nanosafety evaluation and communication;
- ii. intelligent approaches to grouping of nanomaterials based on their properties (especially their biological identity *in situ* in complex milieu) and their subsequent biological impacts in order to intelligently design next-generation nanosafety evaluation and risk assessment strategies;
- iii. quick screening and identification of high risk materials, and implementation of strategies to counter these risks.

For maximising their impact, the funded CSA will be expected to establish synergy with the EU nano-safety Infrastructure⁷, to contribute to the advancement of the EU nano-safety cluster⁸ goals and agenda, to facilitate research cohesion and integration in this area. This will be reflected in the evaluation of the proposal potential impact. The necessary resources and tasks are also expected to be foreseen in the proposals.

NMP.2011.1.3-4 European Platform on Nano Outreach and Dialogue (NODE)

Technical content/scope: Developments in nanotechnologies must be matched by continuous communication and dialogue activities, to consider people's expectations and concerns. The aim is to establish a science-technology-social media-based platform for nanotechnology outreach to support a transparent and continuous dialogue in Europe to continuously monitor and understand consumers' and citizens' opinion on nanotechnologies. A specific emphasis on life-long education is essential. For doing this, the platform aims to use online media to upgrade outreach and bring out the differences in attitudes and opinions across Europe, analysing the state of the debate according to cultural and societal specificities.

A new outreach-dialogue model should be developed so to assess the degree of outreach and responses to dialogue on nanotechnology, in view of incorporating them into coherent policy responses. Controversial issues should receive special attention. Hence, the following actions should be undertaken: (i) develop and/or integrate reputable *surveys of outreach status and public attitudes* on nanotechnology; (ii) *integrate and/or set up* monitoring stations, networks and infrastructures on nano-dialogue to respond to specific needs (e.g. regulation, safety) expressed by stakeholders; (iii) build-on an extensive tool resource base developed by previous EU FP6/7 projects (i.e. socio-economic from *DEEPEN*, *NANOPLAT*, *RISKBRIDGE*, *MACOSPOL*, *NANOCAP*, *FRAMING NANO*, *NANOCODE*, safety from *iNTegRisk* and *MIDIR*, outreach from *CIPAST*, *MEETING OF MINDS*, *NANODIALOGUE*, *TIMEFORNANO*, *NANOTV*, *NANOYOU*, *NANOTOTOUCH* and *DECIDE*) and ongoing OECD Working Party results.

Thus, a modular platform should be put in place to enable stakeholders to: (i) detect attitude and behaviour, identify opinions, expectations and concerns related to nanotechnology; (ii) identify and describe their historical traceability; (iii) identify and understand cause-effect relationships according to the needs of stakeholders paying also attention to national specificities and to integrate and validate them on a comparative basis.

Funding scheme: Coordination and Support Actions (supporting actions).

Expected Impacts: Results from research should be made publicly available for the whole of society (e.g. educators, students, NGOs, media, consumers, industry, researchers, citizens) to get the

pulse of what people really think, with a special focus to identify citizens' and consumers' attitudes, behaviors, trends and prospects, paying attention to national specificities and needs. Validation is essential. This platform could prepare options for framing policy responses in the light of public opinion, becoming a rich source of ideas and facts so as to improve governance and promote multistakeholder partnerships. Validated model should fulfill all criteria of adaptability, attitude mapping, opinion traceability, user-friendliness, and modularity.

II.1.4 Cross-cutting and enabling R&D

The future development and uptake of nanotechnology by EU industry depends upon the development of an efficient and productive research and innovation infrastructure based on interdisciplinarity. It requires as an input collaborative research from several fields of sciences such as: biological sciences, physics, chemistry, electronic, engineering, mathematics, environmental and safety related disciplines, cognitive sciences, social sciences, etc. Its targeted outcome is the creation of knowledge, based on the understanding of the phenomena (nanoscience) at the nano-scale, and their translation into technological know-how (nanotechnologies) to master processes and to develop leading edge research tools, techniques and productive assets, vital for nano-enabled product development.

This activity supports cross-cutting and enabling R&D activities that would enable atomically precise control of processes. The target is to preserve the designed nano-structure and (active) nano-systems with novel or pre-defined properties and behaviour when translated into scalable industrial systems related to their applications. Metrology and instrumentation that underpin most nanotechnology research and tools supporting industrial application development receive particular attention. Availability of affordable, high-quality nanomaterials and intermediates presents another bottleneck which will be addressed.

NMP.2011.1.4-1 Large-scale green and economical synthesis of nanoparticles and nanostructures

Technical content/scope: It is expected that nanotechnology will find its way into almost all future technologies. Just to name a few application areas, new nanoparticle-reinforced and light-weight materials will be used for transport technologies and in construction, materials based on nanoparticles will be employed in catalytic reactors. Nevertheless, the current high cost of synthesising primary nanoparticles and nanostructures, e.g. due to high energy consumption, limits the use of nanomaterials in practical applications.

Therefore, the aim of this topic is to:

- integrate research activity, science and technology advancements for the synthesis of cost-effective nanomaterials. Novel chemical, biological and physical synthesis routes and the combination of these can be considered;
- proposals should integrate nano-technologies, materials design and new modelling concepts to promote product quality (e.g. low impurities, narrow size distribution) and reliability, to the aim of increasing materials functionality, improving batch-to-batch consistency in terms of physical and chemical properties, reducing product costs and energy consumption.

The developed flexible synthesis routes and platforms are expected to deliver a step change in the availability of nanoparticles and nanostructures with high process throughput and low product costs. That is, the focus is on materials and synthesis routes with a demonstrable yield of at least in the order of 100kg/day, in comparison with the current level of at least one order of magnitude lower.

The ability to produce several product variants using the same synthesis route or platform is a further objective.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. Process safety must be ensured, taking into consideration also the subsequent steps, e.g. handling, packaging and transport. Environmental friendliness, e.g. in terms of energy consumption, waste reduction and recyclability is a further aim. Proposals should also include cost/benefit calculations for sample potential applications, demonstrating the economic viability and positive energy balance for utilising nanotechnology in these applications. The actual development of these applications is outside the scope of the topic.

Funding Scheme: Large-scale integrating collaborative projects.

Expected impact: Innovative industrial processes with a significantly higher yield, lower cost and improved environmental friendliness for a given nanomaterial/structure. Reaching these objectives would facilitate using nanotechnology in various applications, including lighter and stronger nanocompound-based materials, thus enabling energy savings; materials with new mechanical, optical or magnetic properties allowing new developments in MEMS, NEMS, computing and telecommunications; stronger or self-cleaning textiles; scratch-proof paints; highly efficient photovoltaic energy harvesting; sensors and devices able to optimise industrial processes, etc.

NMP.2011.1.4-2 Development of nano-scale detection and control techniques for large area substrates

Technical content/scope: In the last years some of the greatest advances of nanotechnology were performed in modifying surfaces via structuring or coating at nanometre and micrometre scale. Dimensions of the used substrates are steadily increasing, e.g. in flat panel or photovoltaic panel production. Current and future developments of integration for functional intelligence in flexible substrates like paper, cardboard or synthetic materials are also based on the fast processing of large area foils.

Nano-scale contamination on the surface or defects and mechanical damages of the surface (e.g. scratches, micro cracks, and coating defects) lead to a continuously decreasing product quality. At present, appropriate measurement techniques and analysis tools are not available to determine nano-scale contamination on these fast moving and very large substrates. Cleaning techniques are limited to liquid based bath or spraying applications, vacuum processes or do not reach the necessary cleanliness level for nano-technical modified surfaces.

The aim of the topic is the development and demonstration of a production integrated system for large scale substrates which will combine the detection of nanoscale contaminants and defects with cleaning and repair. This will lead to significantly lower costs by reducing scrap, increasing yield and quality, while avoiding preventive cleaning processes or oversized clean room installation. The specific research objectives are:

- Selection of appropriate measurement techniques to determine and assess chemical or particle contamination (e.g. filmic contamination or out-gassing residues) on large scaled substrate surfaces like glass, foils and silicon substrates;
- Development of high speed, in line detection and measurement probes and tools to find and analyse nanoscale surface defects for large substrates;
- Development and adaptation of local (spatial limited) cleaning and repairing (e.g. annealing) techniques which could be integrated in the production process for large scaled substrates;

- Local cleaning and repairing techniques reaching the necessary very high cleanliness level for nano-processing, working cross-contamination-free and without generating contamination itself.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners, in terms of technology developers and end users, represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impact: Development of nano-scale detection and control techniques for large area substrates is expected to provide the following benefits: (i) significant cost reduction for the manufacturing of large scale substrates, e.g. flat panels, photovoltaics, foils through reduction of scrap, avoidance of preventive large-scale cleaning, reduction of rework and increase in yield; (ii) measurable higher efficiency of products (e.g. of solar cells); (iii) new opportunities for European automation and instrumentation industry;

NMP.2011.1.4-3 Tools and methodologies for imaging structures and composition at the nanometre scale

Technical content/scope: Understanding of the properties of matter at the nanometre scale, leading to development of novel applications and devices, requires tools for the structural and chemical characterization of nanoparticles and structures with a proper resolution.

Technologies for subsurface interface imaging exist, but many of them are destructive, requiring a cross-section sample, while the resolution of non-destructive tomography techniques and conventional microscopes is still limited. Development of functionally robust nano-interfaces between materials, accurately locating nanoparticles within cells or fabrication of nanostructures require integrated metrology to measure the *in situ* structure, composition, and orientation of nanoparticles or low dimensional structures, like nanowires, nanotubes or coaxial nanostructures. Thus, the objective of the topic is to develop integrated imaging and characterisation tools through:

- development of novel 3D imaging and spectroscopy tools and techniques for reliable in situ chemical and structural analysis at the nanometer scale;
- correlation between alternative 3D imaging and other techniques including the development of multimodal microscopy;
- development of artifact-free sample preparation protocols and procedures;
- development of automation required to control the critical elements of the tools, including data acquisition, image reconstruction and artifact reduction algorithms.

Research could include proof of concept and application to industrially relevant samples, definition of testing procedures, contribution to standardisation, and industrial assessment of measurement tools.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the leading role of SMEs with R&D capacities will be evaluated under the criteria 'Implementation' and 'Impact': the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management; and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criterion: An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.

Expected impact: The development of techniques that permit the structural characterization of buried nanoscale features and defects in a non-destructive way are central for application development in numerous fields, e.g. nanoelectronics, photonics, nanocomposites and nanoporous materials. The techniques would also advance the understanding of biological processes, e.g., cell signalling, protein folding, and gene expression. The research projects should result in the prototype of a new piece of equipment or measurement technology, capable of demonstrating significant improvement over the state of the art, either in terms of resolution and precision, or of ease of use, ruggedness and throughput, providing benefits for scientists and application developers. The manufacturing of these devices would provide benefits for the European instrumentation industry.

NMP.2011.1.4-4 Nanotechnology based implantable and interfaceable devices

Technical content/scope: The cutting-edge research activities on converging sciences and technologies are expected to make a key-impact onto medical applications, paving the way for novel, more effective and precisely targeted solutions for healthcare. Significant breakthroughs have already been achieved and first functioning prototypes, including device designs substituting partially function of organs or devices for cognitive functions or therapies are emerging. Nevertheless, the development of high-added-value device technologies and cost-effective solutions require further research focussing on implantable and interfaceable devices aiming at prosthetics and implants for long-lasting restoration of a cognitive, sensory or motor function. This involves taking advantage of the plasticity and adaptability of the nervous system as well as understanding of short and long term bio-physiological interactions with nanomaterials to promote development of novel therapeutic approaches including:

- Development of bidirectional neural implants and signal communication procedures (neural exchange of information). Interfacing technology for complex implants and artificial organs or limbs. Coding, software modelling and signal shaping;
- Selective and multichannel electrodes or medical sensing devices with surfaces engineered at the nanoscale for optimal contact, combining electronic interfacing with anti-inflammatory and / or antibacterial functions;
- Development of novel material platform for flexible devices with reduced biofouling to achieve long-lasting operation without interface degradation and improved electro-chemical performance. Matching of the mechanical, electrical, and biological properties of implants with tissue characteristics.

In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners and clinicians represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. Relevant directives related to product approval, safety (including biocompatibility and toxicity) and ethical aspects should be taken into consideration reflecting the European Commission's recommendation on a Code of Conduct for responsible nanosciences and nanotechnologies research.

Funding Scheme: Small or medium-scale focused research projects.

Expected impact: The development of implantable and interfaceable devices is expected to provide the following benefits:

- i. Devices leading on a short and medium term to preclinical tests for treatment of traumatic spinal injuries, drug-resistant epilepsies, psychiatric disorders, as well as for the treatment of several chronic neurodegenerative pathologies (e.g. Parkinsonian tremor, retinal photoreceptor loss, cochlear implants);
- ii. New medical sensing devices providing less invasive, fast and accurate, and selectively sensitive diagnostic functions;

- iii. Potential for spin-off applications such as smart gloves with integrated sensing and improved tactile transmission, for industrial hazardous, chemical, biological environments;
- iv. New opportunities for European biomedical industries and advanced SMEs fabricating implantable devices.

NMP.2011.1.4-5 Multiscale Modelling as a tool for Virtual Nanotechnology Experimentation - Coordinated call with Russia

Technical content/scope: Modelling is a crucial element of the design and manufacture of many engineering products – no building, bridge or car is built without extensive use of computational models to test and refine its design.

The development of the necessary mathematical approaches that capture the underlying science must be high priorities in any strategy to deliver tangible outcomes using nanotechnology.

While methodological improvements at nanoscale will significantly improve accuracy and applicability, the ability to link these models such that each works in harmony with the other should lead to a new generation of multiscale CAE tools that will integrate nano- and microstructures into the fundamental capabilities for design and manufacturing.

The proposed research should enable future nanoscale system mathematical functions to be identified and transferred or better applied to physical nanosystems for describing radically new phenomena.

Specific requirements

A maximum of one project will be funded in each one of the following three research areas:

- a) Theoretical analysis, design and functional virtual testing of hetero or hybrid nanostructured elements for use in smart systems, integrated systems, OLEDs, photo-voltaics or energy saving applications.
- b) Theoretical analysis, design and functional virtual testing of organic matrix nanocomposites for industrial applications (including optical, electrical and mechanical properties).
- c) Theoretical analysis, design and functional virtual testing of behavioural features (e.g. biocompatibility and mechanical properties) of biocompatible, metallic nanomaterials.

Proposals could address computational methods for predicting properties across multiple length scales, or micromechanical modelling of materials at industrial length scales, taking account of the influence of size effects, nano-effects, nano-structures and material processing on properties,

Specific elements could include:

- Screening of functional structures at the nanoscale (computer-based and automated screening e.g. using high-throughput-models);
- Tools for designing novel materials and material/shape/microstructure combinations that are optimized for specified applications, (eg to minimize the environmental impact of products, reduced risk of product failure, increased life and/or performance, efficiency);
- Optimization, design end engineering of nanosystems/components ;
- Software development for nanostructure simulation and modeling.

All proposals should have an element of model validation - in which the models are validated against experimental data at least at functional level. This data should either be collected during the project or should be pre-existing. Projects that are entirely theoretical/ computational will not be allowed.

Networking and training opportunities for the scientists involved in using these approaches are particularly crucial for maximising the impact of this vital area of science. The proposals should therefore also take into account the exchange of researchers.

Proposals for Small or medium scale focused research projects which do not include coordination with a Russian project will be considered ineligible. Maximum EU funding: EUR 4.5 million in total for the research topics mentioned. The Russian Authorities have announced a corresponding equivalent funding from the Russian Federation.

Modelling of ultrafast dynamics falls under topic NMP.2011.2.1-2. Proposals focussing exclusively at computational nano-biochemistry and simulation methods for nano-medicine applications are discouraged, as this topic area may be including in a future call.

Funding Scheme: Small or medium-scale focused research projects.

Expected Impact:

- i. The applicability of the resulting tools should be demonstrated by involving industrial end-users or modelling system providers, validating the tool at relevant applications, such as in design of nano-surface, nano-structures or nanofeature enabled new systems;
- ii. The potential economic and societal impact, especially by addressing the "grand challenges" of our society, such as energy, environment, health, safety or mobility, should be clearly demonstrated;
- iii. The state-of-the-art in modelling science and technology should be significantly advanced;
- iv. Increased cooperation between EU and Russian organisations.

II.2 Activity 4.2 **Materials**

Added value materials with higher knowledge content, new functionalities and improved performance are critical for industrial competitiveness and sustainable development; the materials themselves represent a key step in increasing the value of products and their performance, including design and control of their processing, properties and performance. To accelerate progress, a multidisciplinary approach will be fostered, involving chemistry, physics, engineering sciences, theoretical and computational modelling and increasingly the biological sciences.

Research will focus on materials science and engineering defined in order to contribute to Europe's grand challenges, in line with the recent "Lund Declaration", which states that "*Meeting the Grand Challenges also requires (...) taking a global lead in the development of enabling technologies such as (...) materials*". This implies a rigorous exercise of prioritization. Materials are also key to technological advances in virtually all Themes of the 7th Framework Programme concerned with research related to the use of materials in their respective fields of application. Therefore, calls may be launched with other Themes and, where appropriate, focused international cooperation may be promoted.

The definition of this work programme benefited of many and different inputs such as that by the NMP Expert Advisory Group and the European Technology Platforms. Inputs from other FP7 Themes, EURATOM and RFCS have also been taken into account as well as the outcome of studies, workshops and surveys carried out in the last years. This work programme is streamlined with respect to previous years and is structured in 3 parts: *Enabling Research and Development*, *Innovative Materials for Advanced Applications*, and *Structuring Actions*.

Enabling Research and Development develops and exploits the interdisciplinary character of materials science and engineering and has the potential of opening new business areas or production routes. It supports advances in key enabling technologies through the development of new techniques, processes and equipment, thus providing the means to generate giant steps in performance and capabilities. Key Enabling Technologies (KETs) such as advanced materials are of exceptional importance. Mastering such technologies lays stable foundation for well paid jobs in the EU and allows for sustainable, societal-agreed growth. Therefore the Commission proposed for advanced materials to develop and implement a European vision for the industrial deployment of such technologies in the EU.

Materials characterisation, design methods and simulation techniques are also essential to better understand and control materials phenomena, in particular the structure–property relationships at different scales, to improve materials assessment, reliability and durability, and enable industrial applications of materials by design. The integration of atomic, molecular to macro levels in chemical and materials technologies will be supported for developing new concepts, systems and processes. Issues related to the integration of materials and technologies, particularly for multi-sector applications, process development, scaling-up and industrialisation of high added value materials will also be addressed.

For *Innovative Materials for Advanced Applications*, the 2011 work programme will adopt a novel and more effective focus to medium/long-term research in 5 selected branches of industry: Healthcare, ICT, Energy, Environment (and strategic supply) and Transport. If robust research competence in materials research and relevant industrial innovation is built and maintained, Europe will be able to play a significant and lasting role in the global arena, and the potential societal and economic returns in the field of materials' industrial applications will be maximised. Research will address the development of new knowledge-based multifunctional surfaces and materials with tailored properties and predictable performance, for new products and processes targeting a wide range of applications. This requires the knowledge of raw materials, the control of intrinsic

properties, processing and production, taking into account potential impacts on health, safety and the environment throughout their entire life-cycle.

Structuring actions will aim at exploiting the potential of the ERA to boost efficiency and effectiveness of research and innovation in materials science and engineering via creating or reinforcing synergy which will enable the release of the untapped potential of European research. A better linking of actors in research and innovation is envisaged, through further support of networks developing a durable integration, to boost the knowledge intensity of future European products and industrial processes.

II.2.1 Enabling Research and Development

The design of knowledge-based materials relying upon an accurate control of their properties can take advantage of highly performing modern engineering methods and powerful computer-based tools. Engineering tools, associated with modelling and simulation approaches often based on multi-scale methods can help in creating more reliable high performance materials, based on an accurate prediction of their in-service behaviour and life-cycle analysis.

Discoveries of new materials with tailored properties and advances in their processing are the rate-limiting steps in product development in many industrial sectors. The key objective is to radically improve materials by increasing knowledge in materials science, in particular at the nanoscale, as well as to make progress in the field of environmentally friendly materials able to substitute currently harmful applications, and in the field of clean, flexible and efficient materials processing.

NMP-Materials will also support the development of solutions in materials sciences and engineering (including “horizontal technologies”) in order to overcome scientific, technological and related bottlenecks enabling new technologies that can give European industry a strong competitive advantage in the years to come. These technologies are multidisciplinary, cutting across many technological areas with a trend towards convergence and integration, and can assist technology leaders in other fields to capitalise on their research efforts as well.

Greater emphasis on the fundamental understanding of materials will lead to a qualitatively better control over their properties, as well as to the development of new materials. With this respect, European competitiveness will be directly related to the ability in maintaining advanced technology in experimental facilities and continuously developing new analytical tools. Cross-cutting priorities will be the development of new instrumentation methods, the early characterization and prognosis of new materials' behaviour in components and under operating conditions as well as the understanding of complexities, nonlinearity and materials functionalities through bottom-up approaches and materials design.

NMP.2011.2.1-1 Research and innovation for advanced multifunctional ceramic materials

Technical content/scope: The EU is still a major global player in many ceramics industrial subsectors but nevertheless the sector as a whole is faced with a number of competitiveness challenges, many of which have been fuelled by globalisation. Moreover, the absence of an international level playing field on environmental regulations is perceived as a noteworthy threat for European global players. Growth in output has been very modest in recent years for various subsectors, many of them predominantly populated by SMEs. Employment in the EU ceramics sector has generally been on a downward trend since 2000.

EU competitiveness is particularly challenged by new low-cost competitors, increasing prices for energy and raw materials and market imperfections with tariff and non-tariff barriers and IPR issues.

The sector will find it difficult to maintain low-cost production and will have to give substantial priority to new high added-value products to maintain competitive advantage opportunities.

Research proposals should include the following activities. Additional activities may be added as relevant:

- Selection of one (or a limited number of) advanced ceramic material(s) that have the potential to add value to SMEs' products and sustainability to their industrial processes;
- Development of advanced added value ceramic materials that offer increased/simultaneous functionalities, e.g. energy management and dielectric functionality, electrical and thermal conductivity, information collection and management, sensorial perceptions, biological interactions, self healing abilities;
- Research activities in order to appropriately modify and adapt the advanced ceramic materials selected in order to allow their introduction into a future, potentially new production process, preliminarily to and not reaching the production of commercial products;
- Economic, environmental and industrial assessment of the innovation.

Where appropriate, employing graduates to perform experimental work in the SMEs can also be financed within the research. The participation of industrial designers and downstream manufacturers in the research proposals can be considered.

IPR issues relevant to the use of the advanced materials considered should be duly dealt with and clear in advance, so as to streamline and facilitate the process of technology transfer.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the leading role of SMEs with R&D capacities will be evaluated under the criteria 'Implementation' and 'Impact': the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management; and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criterion: An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.

Expected impact: (i) Increase of the knowledge-intensity of the SME's production as far as materials science and engineering are concerned, and/or (ii) Increase of the added value of future SMEs' products, and/or (iii) Reduction of the raw material or energy consumption, and/or (iv) Reduction of the carbon fingerprint, and/or (v) Novel use of advanced materials.

NMP.2011.2.1-2 Modelling of ultrafast dynamics in materials

Technical content/scope: Computational modelling is a major tool to understand and control materials properties. Modelling of dynamic properties has already been initiated, but modelling of ultrafast dynamic behaviour at the femtosecond (fs) timescale is only in its infancy and further research is needed. Ultrafast processes are of importance to many industrial sectors, since e.g. molecular chemical reactions and many phase transition phenomena are determined on a femtosecond timescale.

Research proposals should address ultrafast (at least fs), non-equilibrium transitions appearing in the multi-scale development chain that, if controlled, can accelerate processes and/or form the basis of new solid or soft materials. The femtosecond phenomena targeted should be relevant to the development of materials via the understanding of one or more of the following, but are not limited to:

- catalytic/chemical reactions,
- structural transitions (order-disorder and/or amorphous-crystalline), transitions between redox isomers, transitions between conducting (metal)-semiconducting-insulator phases or multiferroic transitions (ferroelectric, ferro-elastic, magneto-optic, magneto-electric, opto-electric), as well as transitions and phenomena induced and altered by symmetry-breaking (magneto-electric, magneto-chiral) within these states,
- spin manipulation, including spin transitions between different energetic states to produce metal-insulator transitions and spin-driven thermoelectric,
- Femtobiology for conceiving new materials.

Research proposals should establish advanced modelling of realistic systems and contain approaches across the necessary length and time scales, ranging from ab-initio via atomistic to mesoscale models if appropriate. Validation of the models against experimental results should also be carried out for realistic industrial applications.

Funding scheme: Small or medium-scaled focussed research projects.

Expected Impact: (i) Improved control of materials production, improved control of concerned industrial products and processes, and/or (ii) Development of new materials and processes, and/or (iii) progress in the industrial sectors concerned, such as chemistry, ICT, healthcare, transport etc.

II.2.2 Innovative materials for advanced applications

Sustainable products adapted to people's and societal needs distinguished by a combination of innovative materials, successful design and intelligent functionalities are in demand in all sectors of technology and all industries. However, innovations can realize their full potential only if they are transferred rapidly from research into products and released onto the market. Innovative materials with novel or enhanced properties for customised applications represent a real part of potential innovation, beneficial to the competitiveness of European industry, including small and medium-sized enterprises (SMEs). Securing and expanding a leading technology position with this cross-disciplinary approach is key to sustainably enhancing Europe's international competitiveness. Against a continuing background of concerns about the environment, resource and energy pressures, along with increasing global competitiveness, a focused strategy for advanced materials innovation and application is increasingly vital. The development of application-oriented materials requires the specific design of high efficiency materials and processes that encompass phenomena and architectures at the atomic scale and are able to optimize their engineered properties at higher length scales and so in- or in the end-of-service properties of the final products. Research and innovation in materials science and engineering are therefore critical components of Europe's industrial policy towards a competitive and sustainable industrial future. Meanwhile current budgetary constraints may cause a risk averse approach in the research investments of many industries and particularly SMEs, thus jeopardising their competitiveness in the medium to long term as well as their ability to cope with increasingly stringent demand for sustainability of products and processes.

NMP-Materials research will therefore support industry's longer-term research and ambitious industrial innovation, particularly in those branches of industry where considerable potential exists in terms of socio-economic impacts. The application of new materials has a large potential in the conservation of all Earth resources and protection of the environment too, so to not deprive our children of the right to live in a world similar, or even better than, to that of our generation. Research will focus on the design, development and engineering of innovative added-value

materials and unlock their potential for selected technological applications. Following the input of the NMP Expert Advisory Group, five priority key areas of activity will be addressed: Healthcare (in 2011 with reference to biomaterials for the growing ageing population); Information and Communication technologies (no topics in 2011); Energy (in 2011 with reference to superconductivity and lighting to reduce energy consumption and costs); Transport (no topics in 2011) and Environment (in 2011 with reference to the replacement of critical materials and materials to protect and preserve historical goods).

NMP.2011.2.2-1 Novel superconducting materials, architectures and processes for electro-technical applications

Technical content/scope: Although there is plenty of potential envisaged where the use of superconducting (SC) materials would outperform the existing ones or open the route for novel solutions, producing these materials with consistently high quality and reliability needed for competitive exploitation is still in its infancy. Room for improvement has been suggested, ranging from the development of new SC materials to the implementation of novel production cycles.

Research proposals should address such innovative materials, architectures, and production processes for electro-technical applications based on superconductors in which the conducting properties of the materials are central. The combined characteristics of the proposed materials or architectures consisting of SC coatings, buffer layers, and/or substrates, or any other architecture, should result in solutions that are superior to existing ones or open routes to real and cost-effective applications. For replacing existing solutions, the overall performance/cost advantage of the newly proposed solution, both at the level of production and the operation of the application during its life time, should be prominently emphasized. Proof of concept in terms of product and/or process should be delivered within the project, excluding commercially usable prototypes (2006/C323/01), but convincingly proving scalability towards industrial needs. The proposed solutions should be based on a responsible, sustainable and environmentally friendly approach. The environmental sustainability of each developed solution shall be assessed via life cycle assessment studies carried out according to the International Reference Life Cycle Data System (ILCD) Handbook. Dedicated modelling, standardisation and/or the production of (certified) reference materials may also be addressed as an integrated part of the research proposal. In order to ensure the industrial relevance and impact of the research efforts, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding scheme: Large-scale integrating collaborative projects.

Expected impact: (i) SC wires and tapes with better performance for power applications (e.g. motors, generators, transformers) or magnets, leading to a significant market penetration, and/or (ii) Improved properties of the final product or component in terms of combining relevant parameters including, e.g. critical temperature, critical field, critical current density, easy workability, mechanical strength, and reliability, at a competitive cost.

NMP.2011.2.2-2 Biomaterials for tissue engineering for age-related cancer and sensory organ diseases

Technical content/scope: Cancer and sensory diseases disproportionately affect the ageing population and are associated with disability, diminished quality of life, and increased costs for health care and long-term care. Maintaining quality of life in a population affected by these diseases is therefore one of the great challenges of the 21st Century (see also COM(2009) 180). Biomaterials represent a promising avenue to improve the quality of life of people disabled by these diseases. Age-related cancer diseases (such as colon-rectal, urogenital, tracheal cancers) and age-related

sensory organ diseases (such as cataract, macular degeneration and hearing loss) are targeted within this call.

Research proposals are expected to be highly focused on clearly identified clinical needs, not being limited to basic research. The proposed biomaterials are expected to be tailored to the patients and to the degenerative diseases representing a step change beyond the state of the art. A proof of concept for the described application is expected.

Osteoarticular diseases foreseeing bone and cartilage regeneration or knee/hip implants are not addressed by this topic as already covered by previous calls. Neurodegenerative diseases (such as Alzheimer, Parkinson etc) and development of (nano)materials for the targeted delivery of pharmaceutical or bioactive agents have already been covered by other actions and are not addressed here.

Dedicated modelling, standardisation and/or the production of (certified) reference materials may also be addressed as an integrated part of the research proposal. To exploit the potential of multiple use that materials often offer, one research work package may investigate possible use in a substantially different field of industrial application; such a work package should not account for more than 10% of the total resources. Gender differences in regard to the targeted clinical application should be considered, where appropriate.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners and clinicians represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Small or medium-scale focused research projects

Expected impact: (i) Innovative biomaterials especially for the therapy of diseases whose treatment currently relies (mainly) on pharmaceuticals, and/or (ii) Improved performance of prostheses and devices, and/or (iii) Improved quality of life thanks to increased biocompatibility and longer duration of implants, and/or (iv) Success of European biomaterials industries, and/or (v) Contribution to achieving EU policies, such as those mentioned in COM(2009) 180 final.

NMP.2011.2.2-3 Materials for solid state lighting

Technical content/scope: Incandescent light bulbs have been used for over a hundred years for general household lighting but it has only been realised recently that enormous amounts of energy generation could be saved by switching from these inefficient light sources (~5% for incandescent bulbs) to more efficient alternatives. In fact from 1 September 2009, 100W incandescent bulbs are being phased out in the European Union; it is expected that all incandescent light bulbs will disappear from the European Union market by 2012. A growing alternative is lighting produced from light emitting diodes (LEDs), with white LEDs already achieving efficiencies of 30% with efficacies of 100 lm/W and colour rendering index (CRI) of 80.

Research proposals should develop novel materials for energy-efficient solid state lighting such as wide bandgap semiconductors. The target values of 50 to 60% overall efficiency of white LEDs, with an efficacy of 200 lm/W and CRI of over 90, should be possible to be realised in devices within the following 10 years. Research proposals can also consider e.g. the development of new phosphors optimised for use with blue and near ultra-violet LEDs or with red, blue, yellow and green LEDs, as opposed to using those optimised for fluorescent tubes. The material(s) proposed for development should consider any potential environmental implications, including end-of-life disposal. Research proposals should cover options for environmentally friendly solid state lighting materials development to enable the realisation of a design for sustainable solid state white lighting. Work should also be included on material systems that improve the colour rendering for white lighting applications. Research should concentrate on materials development and not on the improvement of device design, but test structures may be included where necessary to test the

materials. The novel materials, architectures and structures considered should be studied bearing in mind the feasibility and reliability of later manufacture and potential cost of resulting white lighting devices.

Funding scheme: Small or medium-scaled focussed research projects.

Expected impact: (i) White lighting solutions with improved efficiency compared to today's LEDs; (ii) Increased internal quantum efficiency of the blue and near UV LEDs from about 70% to at least about 90%; (iii) Reduction of the energy demand for lighting that at present accounts for about 19% of global energy consumption; and/or (iv) Increased operational lifetime of white LED devices of the order of 100.000 hours.

NMP.2011.2.2-4 Novel materials for replacement of critical materials (platinum group metals and rare earths)

Technical content/scope: Some raw materials with high technology applications are critical for the European economy, in particular for high technology products or green technologies. Such materials, which are either naturally limited on Earth or subject to trade restrictions, can become a vital problem for European industrial supply during the next decades. Distortions of a reliable and secure flow of materials to the European supply chain are challenging European industry, economy and society. This challenge is amplified due to the difficulties in finding suitable substitutes of these raw materials. The European Commission has addressed this issue in official documents; more recently, it has highlighted the need of developing new alternative materials with its Communication on key enabling technologies, (COM(2009) 512 final of 30 September 2009), and on raw materials, (COM(2008) 699 final and the accompanying Commission Staff Working Paper SEC (2008) 2741 of 4 November 2008). The expanding global production and consumption of goods has created serious concern about problems related to the overall demand for critical materials. It is of paramount importance to avoid or minimise the consumption of scarce, difficult to explore or expensive materials. The present call is aimed at finding substitutions for such materials.

Research proposals should focus on substituting platinum group metals and rare earth elements, and to develop innovative, more cost-effective and eco-sustainable materials to replace them. The alternative materials should show a durability appropriate to the asset lifecycle (fit for the purpose), minimal inbuilt redundancy/failure and minimal short or long-term impacts on health and the environment. Maintenance issues, demolition/disposal and recyclability opportunities are also important considerations. Hence, smart design, recyclability and energy efficiency for the substitution products are the challenging goal which needs to be achieved in order to be implemented by industry in a second step. Materials selection should consider environmental aspects throughout the material lifecycle, including energy aspects (i.e. embodied energy). Nano- and bio- technological approaches may be addressed where appropriate.

The final objective is to be able to design and manufacture products which equal or even surpass those made with the currently-used materials, in terms of e.g. cost, longevity, repair ability, reusability, low material consumption, low consumption of operation auxiliaries or low content of hazardous substances. Technical, performance, environmental and economic factors should be duly considered in the justification of the optimum replacement material.

Funding Scheme: Small or medium-scale focussed research projects.

Expected impact: (i) Sustainable, long-lasting solutions to the supply of economically crucial but critical materials into the EU, and/or (ii) Contribution to achieving EU policies.

NMP.2011.2.2-5 Development of advanced compatible materials and techniques and their application for the protection, conservation and restoration of cultural heritage assets, NMP – Environment Call

Technical content/scope: Ageing, environmental conditions, use in public or private spaces or in exhibitions and museums, transport, as well as unpredictable events, lead to damages of movable and immovable cultural heritage assets. In general, conservation and restoration use traditional materials and techniques. However, new materials and techniques (including bio- and nanotechnology) may offer advanced, more effective and long-lasting solutions. The socio-economic benefits of conserving cultural heritage generally surpass the costs of conservation; inappropriate interventions, however, may negatively affect this balance. The applicability or development of compatible materials with suitable properties should be assessed in order to evaluate the contribution to preventive conservation and thus, implicitly, to the sustainability and authenticity of the cultural assets.

Research proposals should develop advanced compatible materials (e.g. consolidants, coatings, substitutes etc.) and/or techniques (e.g. cleaning methods, reinforcement etc.) to secure the conservation of the original objects and/or improve the physical state of the damaged objects. Proposals should also assess the long term behaviour of the materials as regards the durability of the historic assets, and/or the performance of the chosen techniques. The potential for adverse environmental and health impacts relating to the new materials and/or techniques should also be assessed.

Proposals may also include materials with novel properties such as self-healing or self-cleaning, or materials with an improved resistance to degradation mechanisms. Dedicated modelling, standardisation and/or the production of (certified) reference materials may also be addressed as part of the research proposals. Training activities may be included. The active participation of industrial partners, including SMEs, represents an added value to the activities and this will be reflected in the evaluation. Priority will be given to proposals that clearly demonstrate the market potential of new materials and techniques.

This topic has been identified as particularly appropriate for the participation of beneficiaries outside the EU, in particular from International Cooperation Partner Countries (ICPC).

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criteria:

- An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.
- The maximum EU requested contribution per project is EUR 3 000 000.

Special Features: Call jointly implemented by the Environment (including Climate Change) and the NMP Themes.

Expected impact: (i) Longer-lasting solutions in the conservation of cultural assets with historical and/or artistic value, and/or (ii) Affordable solutions in terms of cost and/or complexity of operation by those who will use the materials and techniques developed, and/or (iii) Contribution to achieving EU policies, in line with international recommendations in this field. The results of the research projects in this area/topic should clearly benefit SMEs and are expected to create a favourable economic impact on the sector concerned.

NMP.2011.2.2-6 Fundamental properties of novel superconducting materials – coordinated call with Japan

Technical content/scope: Research is needed to improve our fundamental understanding of the basic mechanisms responsible for superconductivity, which are still under debate for many

materials. Moreover, the recent discoveries of novel superconducting materials, including MgB₂ and several families of iron-based superconductors make it more urgent to explore their potential for applications with significant socio-economic benefits, such as the likely gain in energy efficiency.

Projects are called for to investigate the fundamental properties of novel superconducting materials, with focus on their synthesis, structural and/or physical characterisation, mechanisms and theoretical modelling in combination with experimental validation. Successful projects should foresee the recruitment of researchers in the early stages of their career. This call targets a balanced participation from European and Japanese organisations. In order to assure genuine EU-Japanese cooperation, it is important that the proposed research plan properly includes integrated and coordinated research activities between the EU and Japan. The establishment of a close collaboration between European and Japanese partners is mandatory to a level that proposals not including such collaboration will be considered ineligible.

Funding scheme: Small or medium-scale focussed research projects.

Expected impact: (i) More robust European – Japanese research cooperation, and/or (ii) Improved understanding of superconductivity in general and of novel superconducting materials in particular, and/or (iii) Successful joint research, activities, publications, and contributions to scientific events, and/or (iv) More intensive exchange and training of researchers, and/or (v) Improved performance of industrial products in the longer term.

II.2.3 Structuring actions

To contribute more effectively to industrial innovation in Europe, NMP-Materials should also have a structuring effect, building up and exploiting the potential of the European Research Area or - in selected fields – acting at an international level. Actions will be supported to network actors of research and innovation, or to create new synergy. The cross-sectoral nature of materials research and the widespread impact of its applications create obvious links with the other Themes under the Specific Programme 'Cooperation'. The increasingly important international dimension of industrial research requires a proactive approach to working with third countries in the field of materials research. International cooperation activities are, therefore, an important issue, in particular for those research areas where there is clear mutual benefit in terms of knowledge generation and market expansion. Specific actions may be foreseen, such as joint research activities that may be implemented via coordinated calls to address objectives of mutual interest. This may be of interest, in particular, in the case of industrialised countries and those having signed an S&T cooperation agreement which includes the materials field. In addition, specific Support and Coordinated Actions can promote better links with international co-operation partner countries.

In 2011, a SICA call will be launched with Latin American countries in the field of materials, covering a topic on 'sustainable packaging' which appears particularly relevant in terms of local economy, development of technologies and impact on the environment. Cooperation through a coordinated call with Japan in the field of superconductivity is also of mutual interest.

ERANET actions will be implemented to coordinating efforts among Member States to developing a well-coordinated and structured framework for international cooperation in materials science and engineering. These activities are more specific and focussed compared to the ERANET projects and ERANET Plus projects implemented in the last years.

NMP.2011.2.3-1 Advanced packaging materials from renewable biogenic resources (SICA)

Technical content/scope: New approaches to materials and their processing are required to provide functional packaging solutions for a wide range of products including food. It is crucial that for these materials and their production, technological aspects such as the overall eco-balance/sustainability/life cycle are taken into account, and environmentally hazardous consequences like deforestation, water scarcity and soil erosion are considered (eco efficiency analysis).

Research proposals should address the development of advanced packaging materials from renewable biogenic resources. These resources should compete with neither food production nor virgin forest protection. The materials should preferably be made from waste materials e.g. from food production or other by-products. Concepts should be proven and validated, and a sample of a sustainable packaging solution produced from renewable biogenic sources should be delivered at the end of the project. Important issues to be tackled are for example: competitive price with regard to existing solutions, functionalisation and barrier properties, moldability, printability, reuse, recyclability, biodegradability and compostability. The sustainability of the proposed solutions should be demonstrated with a full life-cycle analysis. When the advanced materials can also be used for applications other than packaging (e.g. construction, automotive and electronics), such applications may also be addressed in the project (up to 10% of the total resources). In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding scheme: Small or medium-scale focussed research projects - Specific International Cooperation Actions (SICA) to promote the participation of emerging economies and developing countries: Latin America.

Expected impact(s): (i) Reduction of environmental pollution due to packaging, and/or (ii) Enlarging the basis of raw materials for packaging, and/or (iii) Decrease of the need for valuable raw materials with consequent better use of resources, and/or (iv) Reduction of the dependence on petroleum as a base material, and/or (v) Improved research cooperation between EU and Latin America.

NMP.2011.2.3-2 ERA-NET on research on materials science and engineering, including international cooperation

Technical content/scope: Europe has a strong position in research related to materials science and engineering, nowadays both supported via the EU Framework Programme and by the Member States and Associated Countries. In order to maintain the pace towards a more competitive and sustainable industrial economy, Europe needs boosting research supporting the Union's policies, reducing fragmentation and duplication of research efforts, spreading and implementing best practices, exchanging information of mutual usefulness, and tackling challenges at the most efficient level – where appropriate with other major players in the international arena.

The ERA-NET scheme has allowed launching some successful activities in the field of materials such as MATERA and other initiatives addressing nanoscience, materials and materials engineering. Building upon past experiences, it is now possible to conceive an ERA-NET with a more ambitious scope. It would allow actions within the whole chain of the generation and exploitation of knowledge in materials science and engineering, contribute with novel and reinforced effectiveness to the reduction of research funding fragmentation in Europe in this field and also to the international dimension of the EU Member States and Associated Countries research activities (see

Council conclusions concerning a European partnership for international scientific and technological cooperation)⁸.

Building upon previous positive ERA-NET experiences, in order to effectively contribute to streamline funding initiatives and to give more incisive impetus to the international dimension of the European research, the ERA-NET proposal(s) on materials science and engineering research should focus on

- (i) Concentrated action on common European research priorities in view of implementing joint initiatives, with an emphasis on an enabling and/or interdisciplinary approach to research on materials science and engineering, flexible enough to allow coverage of future topics in related thematic areas;
- (ii) Promote research in materials science and engineering striving for the best possible efficiency and effectiveness. Future actions implemented within this ERA-NET can include materials research activities at a macro, micro or nano level;
- (iii) Assessing current cooperation modes, selecting the best practices and adopting efficient and innovative procedures providing the means for a more efficient implementation of joint activities;
- (iv) Searching for a synergy linked to build the cooperation at an international level and strengthening the status of the European research and industry;
- (v) Formulating and launching possible novel actions that will allow the EU to benefit from and strengthen the European Research Area and the competitiveness of the industry;
- (vi) Promoting high quality research and the effective use and exploitation of the created knowledge along the innovation chain.

The outcome of this topic could serve as input for the planning of research priorities on materials research beyond FP7.

Additional eligibility criteria: Only ERA-NET eligible partners can participate. The minimum number of participants is set at three independent legal entities managing publicly funded national or regional programmes, each of which is established in a Member State or Associated Country.

Funding Scheme: Coordination and Support Actions (coordinating actions)

Expected impact:

- (i) improved efficiency in the coordination and cooperation of Member States and Associated Countries research funding programmes, and/or
- (ii) boosted progress in research, technological development and innovation in the field of industrial technologies and particularly materials research, and/or
- (iii) new dynamism in research, technological development and innovation in the field of materials science and engineering, and/or
- (iv) enlarged research cooperation within the EU,
- (v) and/or improved cooperation with Third Countries, and/or
- (vi) contribution to achieving EU policies.

NMP.2011.2.3-3 Networking of materials laboratories and innovation actors in various industrial sectors for product or process innovation

⁸ 2891st Competitiveness Council meeting, 2 December 2008
http://ec.europa.eu/research/iscp/pdf/comp_council_european_partnership.pdf

Technical content/scope: Europe must create an innovation society where knowledge is utilised rapidly for societal benefit and development. This requires a systematic transformation from fragmented and closed approaches to networked, flexible and open approaches. National and regional academic and research institutions, industries (including SMEs) are key actors in such a dynamic and continuous transformation. Europe has already made great strides in building science parks, incubators, research networks and educational exchanges in materials science and engineering. However, such systems of laboratories, universities, research institutes are not always sufficient for the aggressive, rapid and effective innovation Europe needs to cope successfully with the challenges of the globalised markets. New alliances are needed to mobilise and bring together all the right actors and to broker collaboration between materials research and industrial entrepreneurs.

Coordination proposals are invited to network researchers and industrial entrepreneurs in order to stimulate the creation of a dynamic system that exploits the untapped potential of new materials to create new businesses, e.g. with novel or boosted alliances between material researchers and "creative industries" (such as e.g. architecture, interior design, textiles). These innovation networks should bring together researchers with the other actors in the determination of the added value, via a series of actions aiming at constituting *teams* of innovators, able to close the loop from the laboratories to a product, or a novel industrial process. Actors competent in other aspects that can play a critical role in boosting competitiveness and accelerate success, such as: metrology, standardisation, socio-economic, health or environmental impact, regulation etc., can also be addressed. IPR issues relevant to the use of the advanced materials considered should be duly dealt with, so as to streamline and facilitate the process of technology transfer.

Funding Scheme: Coordination and Support Actions (coordination actions).

Expected impact: (i) Improved coordination in research and innovation, overcoming the "European paradox", and/or (ii) Boosted dynamism of research, technological development and innovation in the field(s), and/or (iii) Better structuring of the European Research Area with a stronger innovation and entrepreneurial character.

II.3 Activity 4.3 New Production

The approach remains focused on the transformation of EU industry from a resource intensive to a sustainable knowledge-based industrial environment. This entails creating the appropriate conditions for continuous innovation (in industrial activities and production systems, including design, infrastructure, equipment, and services) and for developing generic production 'assets' (technologies, organisation, production facilities and human resources), while also meeting overall industrial safety and environmental requirements. Particular attention should be paid to promoting activities which support the adaptation and integration of SMEs to the new needs of the supply chain as well as to giving an impulse to the innovation in SMEs and the creation of high tech SMEs.

The research content in this activity is heavily influenced by the newly created Public-Private Partnership initiatives adopted within the framework of the European recovery package. Many topics which will be covered by the PPP initiatives are relevant to the scope and objectives of the New Production activity of the NMP Theme. Topics that do not fall entirely within the framework of the PPP initiatives remain under the New Production activity.

II.3.1 Development and validation of new industrial models and strategies

The key objective is the development of concepts for “knowledge-based factories as products”, which are capable of adapting themselves continuously to the requirements and tasks of changing market requirements or changing product- and production technologies. This involves the development and validation of new manufacturing and business models covering all aspects of product and process life-cycle, including but not limited to a full risk assessment at each critical stage of the life cycle, enhancing the European industries opportunities to compete and grow in the global market place. The research also focuses on the integration of reconfigurable technical systems and processes with factory level systems; integration of technical intelligence from sensors and actuators; and efficient systems networks based on standards. The scope includes discrete manufacturing and process industries, as well as construction and its associated industries.

NMP.2011.3.1-1 Eco-design for new products

Technical content/scope: Eco-design of products, based on their most suitable life cycle, aims at developing products that meet customers' needs using the lowest possible amount of resources and having a minimum impact on the environment during their life cycle (production, use and disposal). The overall approach encompasses the selection of materials with the smallest environmental impact, and the use of less material if possible in the manufacturing of products and of the most efficient manufacturing and distribution process. It also tries to achieve that during their use the products are resources (including energy) efficient and that they cause less waste and pollution. Longer life time service with possibilities of upgrade is also encouraged. At the end of life product parts and materials should be recovered and reused.

The research objectives are to assess the different design scenarios and to create a clear methodology to ensure that they result in products with a large enough market which have a reduced environmental impact during their complete life-cycle.

Research activities should focus on:

- Establishing a methodology for screening the best performing set of materials, and the adequate design for an easier dismantling in view of a recovery and reuse at the end of life.

- Predefining during product design the most eco-efficient and cost-effective method of production and addressing the overall feasibility of the work and the control of potential risks. Participation of product manufacturers is therefore strongly encouraged.

In addition, research should include selected test cases revealing the life cycle impact on the environment and its implication with existing and emerging regulations, especially with regard to use and disposal (e.g. the WEEE and RoHS directives).

Funding Scheme: Small or medium-scale focused research projects.

Expected impacts: The project results are expected to: (i) establish methodologies for a fully eco-efficient product design in different manufacturing sectors; (ii) reduce the use of resources, including energy, by 20% and the production of waste by 50% compared to existing products; (iii) stimulate eco-efficiency amongst manufacturers and potential users; and (iv) support EU policies and legislation on eco-design.

II.3.2 Adaptive Production Systems

The key objective is to develop production systems and elements for knowledge-based factories through holistic manufacturing engineering concepts. The systems should automatically and continuously adapt production resources and processes in an optimal way with respect to business and production objectives as well as market and technical conditions. Adaptive production systems integrate innovative processes, overcome existing process limitations and handle the transfer of manufacturing know-how into totally new manufacturing related methods. The research focus is on agility, adaptability and anticipation for flexible, small or even single batch oriented production; resource efficient, sustainable production processes; integration of affordable intelligent technologies and process control for optimal production; modular architecture concepts, adaptation of existing manufacturing equipment and resources and implementation of changes related to radically new technologies. The scope includes discrete manufacturing and process industries, supporting also the trend towards miniaturisation, as well as construction.

NMP.2011.3.2-1 Modelling and control of intensified process systems

Technical content/scope: The production processes of many chemicals and bio-pharmaceuticals are not fully optimised. This results for instance in end-products falling outside of specifications, loss of productivity, and/or sub-optimal environmental impact and production of waste.

The adoption of appropriately scaled equipment enables precise control of local process conditions and therefore allows the operation under less stable regimes (e.g. higher temperatures and concentrations, operating inside the explosion limit). This possibility places higher demands on process modelling, and on monitoring and control instruments and systems. Robust modelling and control of the processes is thus critical to the successful deployment of intensified process technologies.

Fundamental process understanding, coupled with appropriate modelling and development of robust on-line monitoring, is necessary to identify which are the critical process parameters that require monitoring and control. It is also useful to develop modelling frameworks that support the systematic generation of models (e.g. software tool boxes and libraries). Versatile and flexible modelling frameworks with features such as model reuse, model decomposition and model aggregation coupled with advanced software architectures will promote significant advances not only in the area of in-silico research, but also in other areas of process development.

The main research objectives are:

- Model based methodological approaches to the identification and selection of critical process parameters requiring on-line control and optimisation in reaction, isolation and formulation processes;
- Sensor technologies capable of measuring critical process parameters and related data handling in micro-scale modular equipment and process systems;
- Methodologies for model generation from a library of multi-scale models;
- Systematic model validation including model structure discrimination and model-based experimental design. Flexible and generic frameworks for computer aided modelling;

The models and control tools developed should be validated under real process conditions.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners and the use of multidisciplinary partnerships represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Small or medium-scale focused research projects.

Expected Impact: The research should result in innovative and robust multi-scale models for use in the process industry, in parallel with the development and deployment of new analytical tools and sensors to allow a global optimisation of process conditions both off and on-line. Reduction of the by-products and increased process efficiency by at least 20%, due to improved control systems, should be targeted.

II.3.3 Networked Production

The key objective is to support highly dynamic networked production through the development of tools and methods for co-operative and value-added operations for global production capability, including the design and innovation of high value-added products. Collaborative design, identification and verification of manufacturing requirements of all involved parties, determination and specification of processes as well as ICT systems are among the required key competencies. The research focus is on design innovation, network configuration, partner identification & partner development, networking, ramp-up, operation, optimisation and support for advanced decision-making. Synergies, coordination and collaboration with the ICT thematic priority will be sought, where appropriate.

This area is implemented through the PPP initiative "Factories of the Future"

II.3.4 Rapid transfer and integration of new technologies into the design and operation of manufacturing processes

The key objective is the development of knowledge-based engineering capacities drawing on in-depth understanding of the behaviour of machines, processes and systems. This allows enterprises, in particular SMEs, to respond quickly to changes in a dynamic environment through integration of knowledge from all fields of manufacturing – from manufacturing networks up to the individual components of a production system. Knowledge-based manufacturing aims at innate transfer and protection of knowledge as well as the utilisation of a wide range of tools for integration of new technologies into the design and operation of new manufacturing processes as quickly and efficiently as possible. The research focus is on the development of advanced engineering concepts through knowledge sharing and knowledge distribution and through the integration of modelling,

simulation and virtual production tools. The scope includes discrete manufacturing and process industries, as well as construction.

NMP.2011.3.4-1 Eco-efficient management of industrial water

Technical content/scope: There is a great societal, environmental and economic need to develop new integrated approaches, methodologies and process technologies for a more efficient and sustainable management of water in industry. Water is used in many industrial processes, for instance as a solvent or as a coolant. Industry requires pure water for many applications and utilizes a variety of purification techniques both in water supply and discharge. To become more independent from scarce water resources, there is a large need in processing industries for a more integrated and energy-efficient use of water by minimising consumption and considering waste water treatment, re-use and recycling. The priority is research, development and demonstration of integrated and energy-efficient water management systems, including close-loop recovery, treatment and purification technologies.

The research focus is on:

- Application of novel tools (i.e. on-line sensor systems) for assessing water quality, recycling potential, and control of bio-fouling, scaling and corrosion, as well as sustainability aiming at optimal process efficiency.
- Innovative technologies to better allow closing of watercycles within processes like for instance selective adsorbents and membrane technologies, sterilisation technologies, electrodialysis, electrocoagulation, membrane microfiltration and desalination should be integrated and improved.
- Technologies for selective removal of raw materials from sludge and selective technologies for removal of contaminants from effluents.
- Integration of processes to allow residual heat, nutrients and minerals to be reused, including new low sludge treatment technologies and technologies for treatment of concentrated salt streams.

The rationalised management of water resources should be part of an integrated approach towards optimised process development and design that could allow a general (heat, solvents, raw materials, by-products) waste minimization, treatment and recycling coupled with the use of renewable energy sources. Water management within food processing is not considered a priority for this call.

The models and tools developed should be validated under real process conditions.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners and the use of multidisciplinary partnerships represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impact: Project results are expected to: (i) lead to a 20% reduction in water and related energy usage, as well as in industrial wastewater production; (ii) enable industries to be fully compliant with the EU policies on water pollution and industrial emissions; and (iii) generate direct economic benefits for the process industry.

II.3.5 Exploitation of the convergence of technologies

The key objective is to stimulate the creation of new industries by facilitating the design, engineering and manufacturing of the next generation of high value-added products, exploiting the

opportunities, integration and convergence of, for example, micro-, nano-, bio-, info- and cognitive technologies. The research focus is on the application of basic research results for the development of new manufacturing processes for new science based products in order to create potentially disruptive products and production systems. Environmental technologies, adaptive and functional materials, cognition based control, intelligent mechatronic systems and process technologies are examples of possible application fields and there is a strong focus on micro and nanomanufacturing. Synergies, coordination and collaboration with the ICT and Bio thematic priorities will be sought, where appropriate.

This area is implemented through the PPP initiative "Factories of the Future"

II.4 Activity 4.4 Integration

The integration of knowledge and technologies of the three areas of research above is essential in order to speed up the transformation of European industry and its economy, while adopting a safe, socially responsible and sustainable approach. The research will focus on new applications and novel, step-change solutions responding to major challenges, including the RTD needs identified by the different European Technology Platforms.

This research should enable and sustain the knowledge-based transformation of current industrial sectors and the development of new science-based sectors through the integration of new knowledge from nano-, materials-, and production technologies in sectoral and cross-sectoral applications. The RTD approaches and objectives applied by the partners should lead to results (products, processes, methods, etc.) and impacts which must observe the guidelines of the sustainable development paradigm, namely the public health, worker safety, environmental protection and the societal dimensions, including governance concerns (public awareness and acceptance). Furthermore this research work must constitute an opportunity for Europe to consolidate the optimal normalisation and standards needed.

Several cross-cutting dimensions could be considered while handling the vast array of sectors and applications and could further inspire the emergence of topics:

- **Transforming traditional industry**, which faces the challenge of low-cost competition. It should increase its productivity through new processes, high-added value products and new business models;
- **Fostering scale-intensive and specialised suppliers industry** through the adoption and integration of new advanced technologies thus enabling the improvement of its leadership in the global market;
- **Promoting Science-based Industry** which will play a key role in establishing a high-value European industry. It will need the integration of most of the advanced technologies dealt with in Nanotechnologies, Materials and Production activities, enabling the development of new, high value, products and services, processes and even leading to new industries.
- **Towards a sustainable supply industry** is another key objective in supporting product and productivity innovation, especially for sectors with a large environmental impact.

NMP.2011.4.0-1 **New technologies based on physical processing of materials for mechanical or electro-technical applications**

Technical content/scope: The majority of modern technologies for the production and processing of materials utilise diverse methods to tailor and optimise their properties using suitable volume or surface treatments. A combination of these treatments with the simultaneous application of an external field (e.g. electric, magnetic) - other than a classical beam treatment such as laser cutting/drilling/welding, ion-beam processing etc. - is one of the ways to modify the microstructure of the material, which should lead to an enhancement of material properties as well as to an increased effectiveness of the processing (e.g. concerning energy consumption).

Research proposals should suggest a novel knowledge-based method of materials processing in external field(s) that might not be open to conventional means of processing and will lead to superior properties of materials for electro-technical or mechanical applications. Methods of materials processing in external fields could target either the implementation in fully new processes and installations or the upgrading of existing ones on production lines. The processing of materials for use exclusively in electronics and photonics is discouraged, as these materials are targeted in other calls.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. Dedicated modelling, standardisation and/or the production of (certified) reference materials may also be addressed as an integrated part of the research proposal. The proposed solutions should be based on a cost-effective, responsible, sustainable and environmentally friendly approach. The environmental sustainability of each developed solution shall be assessed via life cycle assessment studies carried out according to the International Reference Life Cycle Data System (ILCD) Handbook.

Funding scheme: Large-scale Integrating Collaborative Projects.

Expected impact: (i) Substantial enhancement of material properties, e.g. shaping of magnetic hysteresis loops, decrease of magnetic coercivity, increase of yield strength, ductility, surface hardness of metallic sheets, extension of lifetime, increase of operating temperature ranges, and/or (ii) New microstructures via processing of e.g. polymers in electric fields, including controlled dispersion of fillers, and/or (iii) Reduction of costs, zero or at the maximum modest implementation costs into production technology lines.

NMP.2011.4.0-2 Advanced underground technologies for intelligent mining and for inspection, maintenance and excavation

Technical Scope/content: There is a clear need for the development of new advanced underground technologies, in order to respond to the increasing societal demands related to underground activities, where a huge capital investment is required. The productivity in this field is very low compared to other industrial sectors. In addition, the underground activities are going deeper and longer and are thus highly damaging for the environment, as they become at the same time more dirty, difficult and dangerous for the workers. Advanced underground technologies can provide competitive solutions for access to new strategic mineral resources for the society and a quality improvement of surface space by transferring less desirable structures below the ground level.

The key research objective is to advance knowledge and practice in the field of underground construction and mining by identifying, developing, reporting, and stimulating industry adoption of the new methods and techniques, and by encouraging new approaches and research. Developing new advanced tools, methods and processes, and then transferring the technologies to industry is the final goal. In this way, a more competitive EU industry will gain access to resources, and routing traffic can be moved below the ground, offering a means to reduce urban congestion, noise and pollution. Breakthrough solutions are needed to transform the underground related industries into highly technological and competitive industries.

The objective is to develop a set of technologies for clean intelligent underground activities based on new safe and eco-innovative intelligent diagnosis, extraction technologies, adequate materials and processes applicable to all underground activities, such as mining and exploitation and maintenance of the underground structures.

The research should aim at developing fully integrated underground technologies and processes for diagnosis and extraction. Proposals are expected to focus on the following areas, as appropriate for application in the mining and/or construction sector:

- New techniques and processes oriented to the clear detection of the ground ahead of the excavation front. In-situ on-line resource diagnosis for exploration, continuous extraction and recovery of by-products with new sensors for grade control, rock mechanics etc.; new drilling technology; integrated and automated data processing and analysis for 3D underground geology.

- New automated underground technologies for safe and “invisible” deep in-situ extraction to avoid negative impacts on health, safety and environmental including small-scale mechanical excavation and backfill systems and their maintenance.
- Extensive risk assessment modelling and simulation on existing surroundings in urban and non urban areas, model-based prognoses of damage on existing infrastructures and working sites, (flood) water storages, monitoring concepts, cost and risk models in line with new regulations.
- Development of master plans/concepts/technologies for inspection, maintenance and retrofitting efforts of existing and new underground structures. (e.g. mines, road or railways tunnels and utilities networks)

Deliverables include the development, integration and demonstration tests in the field of the above concepts, technologies and tools. In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners and industrially-oriented decision making represent an added value and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected impact: Project results are expected to: (i) increase the productivity of underground activities by at least 20%; (ii) enable mining and underground operations with zero impact on existing surroundings in urban and non urban areas; (iii) create inherently safe underground working and operating environments; (iv) strengthen the global competitiveness of the European mining and construction industries; and (v) increase the sustainable access to underground resources in Europe, with the related decrease of EU dependency on resource imports.

NMP.2011.4.0-3 Advanced textiles for the energy and environmental protection markets

Technical content/scope: Advanced textile materials and related production processes have the potential to be used more extensively, providing added value, in the increasingly relevant markets of (1) renewable energy generation, harvesting, storage and transmission; and of (2) environmental management, including the protection of human and natural habitats from natural disasters (earthquakes, floods, landslides etc), the rehabilitation of such habitats after destructive natural or man-made impacts (droughts, wild fires, oil spillages and other industrial accidents, mining activity etc), water recovery and preservation in dry regions or more effective water use in agriculture and landscaping. Research results could be beneficial for entirely new applications, the replacement of lower performing or less economic existing solutions or the integration of added-value functionalities to existing products.

The technological focus should be on the combination of developments in fibrous and fibre-composite materials with advanced textile, component integration and surface functionalisation technologies, as well as on the related production processes. Wherever technologically feasible and economically viable, the use of renewable biomass-based materials should be considered.

Projects should take a holistic value chain approach with strong involvement of end users and where applicable public procurers. In such approaches it is important to consider availability and economics of raw material supply, ensure high productivity, flexibility and versatility of the proposed innovative production technologies to manufacture such new products at cost levels comparable to conventional products. This is necessary to address the performance and economics of the targeted new products or product-service systems over their entire production and life cycle including installation, maintenance, repair and recycling or wherever possible controlled biodegradation.

SME dedicated Collaborative Projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the leading role of SMEs with R&D capacities will be evaluated under the criteria 'Implementation' and 'Impact': the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management; and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criterion: An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.

Expected impact: Project results are expected to: (i) have a positive economic impact on the technical textiles industry in Europe by offering growth potential for European SMEs and opening attractive market opportunities at a global scale; (ii) exploit and strengthen the technological leadership of European industry in the domains of technical textiles and the related technology providers; (iii) provide significant societal and environmental benefits, for instance by mitigating the impacts of climate change; (iv) enable the potential for large surface textile applications, facing the energy, water and/or environmental challenges; and (v) target a product cost reduction by at least 20% and at least a 100% production increase in large scale manufacturing of technical textiles in Europe in the energy and environmental application domains, also allowing a worldwide application (including developing countries).

NMP.2011.4.0-4 Organisation of events related to the Presidencies of the European Union

Technical content/scope: An integral part of the NMP Theme's activity is to organise, together with successive EU presidencies, events of a strategic nature. The proposed Support Action(s) should contribute to new EuroNanoForum (ENF) and *Manufuture* conferences, activities related to the EU Chairmanship of the IMS (Intelligent Manufacturing Systems) Scheme, or other appropriate new events to be held in a Member State which will hold a forthcoming Presidency of the European Union, specifically Denmark – Cyprus (2012 Presidencies). In order to ensure high political and strategic relevance, the active involvement of the competent National Authority(ies) will be evaluated under criteria 'Quality' and 'Impact'. The proposed Support Action(s) should address topics that are of high relevance at the date of its taking place. An appropriate equilibrium should be present in the proposed action(s), with balanced presentation of various research and industrial elements and points of view. Participation of non-EU actors is possible. Outreach activities may be included such as e.g. a press programme and/or an event dedicated to schools. One Support Action can address the organisation of a dedicated NMP event; this event does not necessarily have to be organised in/by a country holding the EU Presidency, but may well be coordinated with an ENF edition.

Funding scheme: Coordination and Support Actions (supporting actions).

Expected impact: (i) Review of research, industrial and/or societal developments linked to the nanotechnology and/or the NMP areas, as appropriate; (ii) sharing of information and comparison of points of views; (iii) support to the activity of various stakeholders: natural scientists, social scientists, ethicists, researchers, industrialists, investors, museums and/or schools.

NMP.2011.4.0-5 Support to Networks of Excellence with durable integrated structures

Several Networks of Excellence (NoEs) have been operating in the NMP Programme. The NoEs have established Durable Integrated Structures, which focus on four NoE activities such as a joint research road map, a joint educational programme, a joint infrastructure and joint services.

Support action proposals should demonstrate a track-record in such activities, as well as a realistic plan to achieve financial viability, and they should aim at expanding the current activities by

- ensuring coverage of industrial technologies research relevant to one or more particular application sector(s) e.g. Healthcare, Environment, Energy, ICT, Manufacturing;
- ensuring the extended participation of relevant industrial partners.

If necessary and rational from the point of view of the subject area, a single proposal may include more than one durable integrated structure.

Additional eligibility criterion: Maximum EU requested funding must not exceed EUR 500 000.

Funding scheme: Coordination and support actions (supporting actions)

Expected impact: (i) Improved coordination in research and innovation, and/or (ii) More robust critical mass of the durable integrated structure, and/or (iii) Boosted dynamism of research, technological development and innovation in the field(s), and/or (iii) Better structuring of the European Research Area.

NMP.2011.4.0-6 ERA-NET on the Industrial Handling of Raw Materials for European industries

Technical content/scope: The objective of the ERA-NET is to step up coordination of research programmes in the field of industrial production and supply of raw materials. This should be achieved in line with the integrated strategy proposed in the EU Raw Materials Initiative (RMI) by improving use of the EU mineral resources through innovative exploration, extraction and processing technologies; and by reducing the EU's consumption of raw materials through new industrial processes increasing resource efficiency, recycling and substitution.

The ERA-NET should create an efficient long-lasting working platform to benchmark national programmes and establish eventually joint RTD programmes between the involved partners, resulting in joint/coordinated calls within the project. That will be facilitated by quick and effective transfer of good practice from other ERA-NETs. The ERA-NET is expected to establish an efficient collaboration with industry, in particular with the European Technology Platform on Sustainable Mineral Resources, in roadmapping and networking activities.

Additional eligibility criteria: Only ERA-NET eligible partners can participate. The minimum number of participants is set at three independent legal entities managing publicly funded national or regional programmes, each of which is established in a Member State or Associated Country.

Funding Scheme: Coordination and Support Actions (coordinating actions)

Expected impact: This activity is expected to set the basis for: (i) a long-lasting cooperation of research programmes in this field at national and regional level; and (ii) addressing in a coordinated way issues of common interest, by targeting the strategies of sustainable access of European industries to raw materials and efficient industrial handling of raw materials, taking into account the EU Raw Materials Initiative.

NMP.2011.4.0-7 ERA-NET on Industrial Safety

Technical content/scope: The objective of the ERA-NET on Industrial Safety is to step up coordination of research programmes carried out at national or regional level in the fields of safety

related to industrial activities, including safety of critical infrastructures and fixed installations in production systems, and prevention of major accidents with off-site consequences and risks to the environment and the society.

This ERA-NET will focus on the ways to improve industrial competitiveness by reducing production disruption and by accompanying safe technological development. The identification of RTD priorities towards the implementation of joint activities and programmes, including joint calls, may involve several levels of cooperation and coordination, depending on the degree of maturity of the network.

Additional eligibility criteria: Only ERA-NET eligible partners can participate. The minimum number of participants is set at three independent legal entities managing publicly funded national or regional programmes, each of which is established in a Member State or Associated Country.

Funding Scheme: Coordination and Support Actions (coordinating actions).

Expected impact: This activity is expected to set the basis for: (i) long-lasting cooperation in key fields of industrial safety research at national and regional level; (ii) helping to solve problems related to industrial risks, for instance through transnational calls to produce jointly developed new technologies and methods to improve safety in industry; and (iii) providing the basis for harmonised standards and legislation.

NMP.2011.4.0-8 NCP trans-national activities

Technical content / scope: National Contact Points (NCPs) for the NMP Programme have been organised in a network to support the Commission in the implementation of the 7th FP, to provide potential participants with an information and assistance service, and to improve the cooperation and share good practices among the NCPs. This Work Programme will continue to encourage trans-national cooperation activities such as coordinated awareness campaigns, joint workshops, training, twinning schemes, partner-search and brokerage events. Attention will also be given to helping less experienced NCPs (including appointed FP7 Contacts in third countries) to rapidly acquire the know-how accumulated in other countries.

These activities should help the Commission in raising the awareness of proposers of schemes or modus operandi linked with new EU initiatives likely to be decided in the last 3 years of FP7, and in connection with the preparation of future research programmes.

All officially appointed NCPs do not necessarily need to be a member of the selected consortium but sufficient assurance needs to be provided that the widest possible network of NCPs will be involved in the activities, in order to reach the desired outcomes. If certain NCPs do not wish to be involved in the activities of the network, this fact should be explicitly documented in the proposal. Non-NCP participants are ineligible.

Funding scheme: Coordination and Support Actions (coordinating actions)

Additional eligibility criterion: To be eligible, the proposal must involve only the officially appointed NCPs.

Expected impact: (i) An improved NCP service across Europe, therefore helping simplify access to FP7 calls, lowering the entry barriers for newcomers, and raising the average quality of submitted proposals; (ii) support the proposers in submitting proposals of good quality and attracting newcomers to the programme.

II.5 Recovery Package: Public-Private Partnership (PPP) topics within NMP

The European Economic Recovery Plan adopted by the European Commission on 26 November 2008 and endorsed by the European Council on 11-12 December 2008 proposes actions to develop technologies for the manufacturing, construction and automotive sectors, which have recently seen demand plummet as a result of the crisis and which face significant challenges in the transition to the green economy. The Commission proposed to increase research financing through the RSFF instrument and to launch three Public-Private Partnerships (PPPs) which provide the required support to the three sectors:

- in the manufacturing sector: a 'Factories of the Future' initiative to help EU manufacturers across sectors, in particular SMEs, to adapt to global competitive pressures by increasing the technological base of EU manufacturing through the development and integration of the enabling technologies of the future, such as engineering technologies for adaptable machines and industrial processes, ICT, and advanced materials (EUR 1.2 billion);
- in the construction sector: an 'Energy-efficient Buildings' initiative to promote green technologies and the development of energy-efficient systems and materials in new and renovated buildings with a view to reducing radically their energy consumption and CO₂ emissions (EUR 1 billion);
- in the automotive sector: a 'Green Cars' initiative, involving research on a broad range of technologies and smart energy infrastructures essential to achieve a breakthrough in the use of renewable and non-polluting energy sources, safety and traffic fluidity (EUR 1 billion).

These initiatives are part of a comprehensive, integrated package to be implemented in cooperation between all the responsible services within the Commission, complemented by actions on the demand-side, such as public procurement, technical standards, and regulatory measures. This includes a further EUR 4 billion for non-research activities under the Green Cars Initiative.

The three PPPs are intended to prevent the crisis from deflecting attention from the EU's longer-term interests and the need to invest in its future. Research and Innovation are considered as strategic and "smart" investments to prepare the ground for the future of the EU economy which has to become a knowledge-based and low carbon economy, as stated in the Europe 2020 strategy. This is crucial for the EU to come out from the crisis stronger, more sustainable and more competitive.

The Commission, working in close collaboration with industrial representatives, has developed multi-annual roadmaps and longer-term research strategies for the three sectors. For 2011, the initiatives will continue to be implemented through a series of Cross-thematic Calls under the 2011 Work Programme between the relevant FP7 themes. Responsibility for these Cross-thematic Calls is as follows:

- The 'Factories of the Future' initiative involves financial support from the NMP⁹ and ICT¹⁰ Themes;
- The 'Energy-efficient Buildings' initiative involves financial support from the NMP, Energy, ICT and Environment Themes;
- The 'Green Cars' initiative involves financial support from the Transport, ICT, NMP and Environment Themes.

In addressing the industrial needs and objectives of each PPP, the Themes will work closely together to ensure a coherent, complementary and holistic approach. To ensure high visibility and to promote cooperation and exchange of information between the research projects funded under the

⁹ Nanosciences, Nanotechnologies, Materials & New Production Technologies

¹⁰ Information and Communication Technologies

different Themes, it is intended to gather the researchers and the industrial stakeholders together in annual cross-thematic workshops and seminars for each PPP. This would be part of the implementation of the projects.

II.5.1 "Factories of the Future" Public-Private Partnership (FoF) - Cross-thematic Coordination between NMP and ICT

Manufacturing is still the driving force of the European economy. Manufacturing activity in Europe represents approximately **21% of the EU GDP** and provides about **20% of all jobs** (more than 30 million) in **25 different industrial sectors**, largely dominated **by SMEs**. With each job on the factory floor generating approximately two other jobs in services, about 60 million people are additionally engaged in the related service areas. Therefore, manufacturing is of high importance to Europe, with a huge potential to generate wealth, jobs and a better quality of life. The long-term shift from a cost-based competitive advantage to one based on high added value requires that European manufacturing increases its technological base, building on the EU's excellent R&D in this domain, and develops a number of **enabling trans-sectoral production technologies**.

The *Factories of the Future* PPP Initiative aims at helping EU manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by developing the necessary enabling technologies to support EU manufacturing across a broad range of sectors. It will help European industry to meet the increasing global consumer demand for greener, more customised and higher quality products through the necessary transition to a demand-driven industry with lower waste generation and energy consumption.

The activities will concentrate on increasing the technological base of EU manufacturing through the development and integration of the enabling technologies of the future, such as engineering technologies for adaptable machines and industrial processes, ICT for manufacturing, and the novel industrial handling of advanced materials. The initiative will concentrate on industry-led R&D projects and will include demonstration activities, such as large-scale production-line demonstrators for validation and market applications. The partnership will work together to identify the R&D needs of manufacturing industry and in particular SMEs. In order to further ensure the PPP character of the initiative, a large part of the activities in the projects is expected to be performed by industrial organisations themselves. This initiative, being by nature **cross-sectoral** and including efforts to address the **needs of SMEs**, aims to transform Europe into a dynamic and competitive knowledge-based economy by delivering:

- A new European model of production systems for the factories of the future (e.g. transformable factories, networked factories, learning factories) depending on different drivers such as high performance, high customisation, environmental friendliness, high efficiency of resources, human potential and knowledge creation.
- ICT-based production systems and high quality manufacturing technologies capable of optimising their performance with a high degree of autonomy and adaptability for a balanced combination of high throughput and high accuracy production.
- Sustainable manufacturing tools, methodologies and processes that have the capability of cost-efficiently shaping, handling and assembling products composed of complex and novel materials.

II.5.1.1 "Factories of the Future (FoF)" - Public-Private Partnership – - Topics covered by the NMP Theme

FoF.NMP.2011-1 The Eco-Factory: cleaner and more resource-efficient production in manufacturing

Technical content/scope: The Eco-Factory, focusing on the innovation of critical manufacturing processes, requires multidisciplinary scientific expertise to support the knowledge-based eco-engineering of manufacturing processes and to foster the use of advanced sustainable technologies inside the factory. This involves process simulation and modelling, process life-cycle assessment and benchmarking of different options, the development of new manufacturing technologies and the improvement of the green performance of current manufacturing.

Cleaner and more resource-efficient production in manufacturing implies the application of an integrated environmental protection strategy to manufacturing processes aiming at increasing the overall efficiency of production systems by the decrease in the use of resources and energy, and in emissions and waste treatment and recycling at the point of use. In the manufacturing chain, an integrated and holistic approach is proposed aiming at:

- Preventing environmental pollution, i.e. waste production and resource and energy dissipation, throughout the production site operation, by evaluating the global burden to the eco-system and by developing efficient industrial process control, planning and scheduling (e.g. using sustainability oriented decision support systems for the optimisation of the manufacturing processes along the whole value-chain).
- Reducing global resources consumption, in particular energy usage, by developing and evaluating alternative manufacturing technologies to replace existing resource-intensive manufacturing processes, including tools for modelling resource consumption, developing standards for such models and strategies to maximise the output against resource consumption.
- Developing multi-objective process simulation optimisation methodologies, enabling a more sustainable, efficient and competitive manufacturing of high added-value products.
- Integration of monitoring tools based on Key Environmental Performance Indicators and either local or remote smart components that collect and process information about the product's whole ecological footprint, and reconfigure the production parameters.

The Eco-Factory also requires innovative management methodologies including fast integration of advanced technologies and new business strategies for greener production.

In order to deliver breakthrough research with major impacts on competitive and sustainable manufacturing, the Eco-Factory approach must involve an integrated, cross-sectoral and interdisciplinary team, including large industrial groups and SMEs as well as technological and socio-economic expertise, ensuring a fast innovation transfer from R&D to industrial applications (including SMEs).

The projects are expected to cover demonstration activities, including pilot implementations in industrial settings. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected impact: Increase in competitiveness and sustainability of manufacturing processes, by advanced design options and guidelines for the manufacturing of new greener products with tailored properties, e.g. using additive manufacturing to decrease waste. Strengthening the environmental performance of the eco-factories by reducing resource consumption, energy and waste by at least 20%. Improving the development and access to markets of innovative environmental technologies, helping SMEs adapt to emerging market needs and protecting and creating new job opportunities. Knowledge of new scientific, technical, economic and social factors to support European policy development and the standardisation and definition of eco-labelled processes and products.

FoF.NMP.2011-2 Cooperative machines and open-architecture control systems

Technical content/scope: The transformation of traditional production line concepts to non-hierarchical agglomerates of autonomous and mobile manufacturing units is a key technology for new European production models. Moreover, open architecture for manufacturing systems implies easier integration and networking of the control systems of equipment modules and will result in enhanced production performance.

Novel approaches in these domains shall encompass the life cycle of the production systems from the development of generic manufacturing ontologies, methods and tools for the development of cooperative production systems to integrated engineering systems, characterised by intelligent monitoring and control systems, predictive performance solutions and a high level of re-configurability. Research activities on human-machine interface (HMI) for enhanced integration of the human workforce in working environment may also be included. Research and development needs to focus on the application of agent control technologies, e.g. Holonic/Evolvable Manufacturing Systems or Service Oriented Control Architectures for autonomous manufacturing components as well as methods and strategies to update the design and performance of manufacturing units during their life cycles. R&D projects should lead to multi-sectoral system solutions and address the current limitations in specific manufacturing domains.

The projects are expected to cover demonstration activities, including pilot implementations in industrial settings. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners, including SMEs, represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Small or medium-scale focused research projects.

Expected impact: The research efforts will demonstrate the feasibility and technological advantage of the new European factories of the future in traditional and emerging industrial sectors. Results will stimulate important innovations in production technology and enhance industrial work environments, especially in traditional sectors including food and agro-industries. The technology developed will drastically improve the international position of European manufacturers with respect to their openness to adopt new manufacturing processes and product innovations.

FoF.NMP.2011-3 Robots for automation of post-production and other auxiliary processes

Technical content/scope: In the future the scope of application of robots will tremendously increase as far as their autonomy and affordability, enabling industrial and service robots to carry out more complex life-cycle oriented jobs, e.g. those which need to be carried out after the product has been delivered to its customer or other auxiliary tasks during the production process itself. This may, for example, include recycling and dismantling, inspection, repair, maintenance or other re-configuration tasks and more in general post-production automation tasks, as well as the auxiliary processes in the production chains. However, today's systems are too rigid (i.e. designed for specific applications), they are rather expensive and often unusable in physical conditions where humans

can not easily get to (e.g., under water, small spaces, or dangerous locations) or cover efficiently (e.g. large structures). Therefore, manufacturing operations with robots in areas that are traditionally human-intensive and not automated would require enhanced capabilities of man-machine cooperative approaches.

To successfully perform complex tasks over the entire product life-cycle in a very open task spectrum, strict requirements with regard to higher degrees of adaptability, scalability, flexibility and dependability must be linked capabilities associated with natural intelligence and perception (e.g. identification and manipulation of unknown component geometry), skilled work reasoning, as well as sophisticated motor abilities, in order to cope with incomplete or non up-to-date information about the parts and the production settings. The automation of ancillary processes in production will extend over several inspection, disassembly, treatment and manipulation tasks, and demand for multi-task planning of processes and action in dense structures, strategies for sequencing and choice of treatment, repair and replacement. Semantics, reasoning, learning and planning methods will also be needed.

The projects are expected to cover demonstration activities, including pilot implementations in industrial settings. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Small or medium-scale focused research projects.

Expected Impact: Most relevant industrial sectors are in capital intensive investment goods (e.g. construction, energy and aeronautics), but the results developed can be applicable to other products having high life-cycle costs. Full life-cycle services are envisaged such as in-field servicing, repair, refurbishing, upgrading, and associated services such as inspection, monitoring and recycling. At the same time, the use of robots in complex manipulation tasks in other industrial sectors will be made possible by the availability of cost effective and flexible automated solutions. The new robotised systems offered should be able to extend the service life and/or improve the operational efficiency and functionality of the product, while at the same time reducing the overall life-cycle costs.

FoF.NMP.2011-4 High-tech solutions in the production processes for customised green, safe and healthy consumer products

Technical content/scope: The market trend towards customised, green, safe and healthy consumer products requires a new generation of production systems. Industrial production capacity will need to be able to respond to an increasingly turbulent and uncertain demand for highly-customised products, whose complexity is constantly increasing. Compared to the past, customers demand higher quality, quicker delivery times and shorter product lifecycles. All this requires high flexibility and the permanent adaptation of machines, process equipment and production systems to evolving products and processes, with special consideration for applications in traditional industries.

Customisation of products will range from product technical performance to integration of advanced product functionalities and modification of product features oriented towards specific consumer needs and requirements, such as comfort, health, well-being and safety. Sustainability of products and production processes also has to be addressed, considering their overall life cycle, from conception and design through to disposal and recycling, by means of novel Life-Cycle Assessment methods and tools. Such new technologies will have to be fully integrated in future production solutions, in order to successfully satisfy several aspects of personalised products, from increased customer interaction regarding trends and new requirements through co-design solutions to new agile, fast and eco-effective manufacturing processes performed by new generation of machines, tools, and supporting systems (in areas such as internal logistic or production

scheduling). The integration of new high-performance and eco-compatible materials for personalised green customer products also needs to be addressed.

High-tech production solutions for personalised green, safe, and healthy customer products are particularly crucial for all those sectors where a very high level of customisation is required in terms of technical performance and functionalities of individual products. The developed technologies shall be demonstrated through pilot production with reference to specific needs of target groups, such as children, people with disabilities, the aged or the overweight, and addressing particular market segments and applications (e.g. healthcare, food, sport, leisure and fashion).

SME-dedicated Collaborative Projects are specifically designed to encourage SME participation in research and innovation representing the complete value added of the targeted sectors. The projects are expected to cover demonstration activities, including pilot implementations in industrial settings.

In order to ensure an efficient implementation and maximum impact of SME-related activities, the leading role of SMEs with R&D capacities will be evaluated under the criteria 'Implementation' and 'Impact': the coordinator does not need to be an SME but the participating SMEs should have the decision making power in the project management; and the output should be for the benefit of the participating SMEs and the targeted SME dominated industrial communities.

Funding Scheme: SME-targeted collaborative projects.

Additional eligibility criterion: An additional eligibility criterion related to SME participation applying to this topic is set out in the call fiche.

Expected Impact: The global market for consumer goods is expected to increase significantly in the next decade. Societal concerns on consumer health, safety and well-being should be strongly addressed, as well as sustainability of consumer goods and their manufacturing processes. A new generation of consumer products and production systems is thus expected to both exploit the potential of high value-added European manufacturing industries and significantly improve the consumer life-style through green customised products and processes.

For European SMEs operating in such sectors these innovations are crucial to maintain and increase their role in future turbulent markets, considering that the consumers' expectations in terms of health, safety and eco-friendliness are strongly changing due to ageing and globalisation phenomena.

FoF.NMP.2011-5

Towards zero-defect manufacturing

Technical content/scope: Nowadays, manufacturing industries very frequently operate in data-rich environments. On the one hand, product quality is increasingly characterised by multiple geometric specifications of complex product's shape (e.g. in automotive, white-goods and aerospace industries). On the other hand, the quality process is to a greater extent associated with process data gathering. In fact, moving the attention from product data to process data allows to extend quality monitoring and optimisation strategies also to short-run production (e.g. small-lots, customised manufacturing).

From the system viewpoint, data collection, data presentation and root cause reasoning needs to be developed to allow continuous monitoring of the performance of the different process stages to master propagation of defects within or between processes and increase the robustness of processes.

In these scenarios, traditional "Six-Sigma" approaches can no longer help to achieve zero-defect manufacturing, given their limitation to simple data sets (invariant and independent data over time). Those methodologies have to be improved by controlling the process parameters in real time (in the relevant parameters field) and by the use of pre-processing prognosis and proactive controls on processes, production systems and sub-systems integrated in the production lines/cells. This includes the application of sensors for process diagnostics, monitoring and visualisation. The

integration of cognitive systems will enable the development of intelligent and self-optimising machines for “zero-defect” manufacturing, with increased process capability (of $C_{pk}=2.0$ or higher) thanks to new strategies for data-rich quality monitoring, control and optimisation.

From the hardware viewpoint, multi-resolution data-gathering devices are foreseen to integrate intelligence into the machining process after appropriate integration. Thus, new cost-efficient tools for quality monitoring and optimisation with multi-resolution, multivariate and auto-correlated data have to be developed. The research in this area will focus on:

- system approaches for monitoring and data processing of dimensional fluctuations;
- efficient simulation tools and methods to predict the machining system behaviour which can be utilised for efficient operation planning to be combined with in-process monitoring;
- innovative solutions for intelligent manufacturing systems, in support of customising and build-to-order strategies; and
- extensive integration capabilities in production equipment of intelligent, autonomous, and self-adaptive devices (integrated, self-powered sensors and actuators) at low cost for process monitoring, control and quality management.

The projects are expected to cover demonstration activities, including pilot implementations in industrial settings. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impact: The development of innovative solutions for zero-defect manufacturing is of strategic relevance for Europe, especially in the domains of parts manufacturing with conventional technologies such as machining, cutting, forming, coating and others. The reduction of losses by extensive quality control and the increase of efficiency in manufacturing are expected in many industries, in particular in the traditional sectors.

FoF.NMP.2011-6 Manufacturing chains for nano-phased components and coatings

Technical content/scope: Recent research results and high-tech solutions demonstrate the potential and the maturity of nanotechnology to be applied in large scale (bulk and surface), high volume and low cost applications. The integration of high-performance nano-intermediates is considered one of the most promising economic opportunities of industrial nanotechnology. The use and integration of these materials and components will enable a new generation of products with new functionalities, create new market opportunities and improve competitiveness. The challenge for industry is to develop new industrial-scale processes for nano-structured high-performance materials and to integrate them into existing or new micro/macro-manufacturing chains.

The research focus should be on new and intelligent platforms, equipment and tools, which enable the processing and the integration of nano-materials in new or existing micro/macro-manufacturing chains. The structuring of materials at the nano-scale introduces new functionalities for e.g. optical or sensing. The aim is to manufacture new functional micro-macro devices, products and systems in a competitive way by integrating nanostructures and exploiting the potential and advantages of nano-phased materials. The projects are expected to develop/upgrade appropriate high-throughput, cost-efficient processes (e.g. extrusion, moulding, sintering, lithography, imprinting or surface deposition) for the integration of novel nano-materials into new products, exploiting the specific characteristics of those materials and the advantages of high-volume mature manufacturing technologies.

The manufacturing chain shall include intelligent manufacturing solutions like on-line monitoring and quality inspection systems in order to ensure efficiency, reliability and high product quality. Proposals should provide for adequate operation conditions in terms of cleanliness and environment, health and safety (EHS) requirements and aim for eco-friendly manufacturing routes to encourage energy saving, cost and waste reduction, and recycling.

The projects are expected to cover demonstration activities, including pilot implementations in industrial settings and to show a clear application potential in the short-term. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding Scheme: Large-scale integrating collaborative projects.

Expected Impacts: Improvement of the technological base of the European manufacturing industry through new innovative processes and equipment for high-throughput, cost-efficient production of nanostructured components and/or devices for future applications in e.g. optics, electronics and/or lighting.

Projects are expected to provide substantial innovation in industry and market perspectives and to contribute to competitiveness, sustainability and employment in the medium term, enabling competitive and sustainable industrial production of new, high added-value products and components based upon nano-materials for cross-sectoral applications.

II.5.2 "Energy-efficient Buildings (EeB)" - Public-Private Partnership –

Cross-thematic Coordination between NMP, ICT, Energy and Environment (including Climate Change)

The construction industry accounts for more than 10 % of the EU's GDP and employs 32 million people in large, medium and small enterprises (direct and indirect employment). The construction sector is the highest contributor to the emission of Green House Gases with an average value estimated in most developed countries at close to 33%, knowing that around 40% of the total energy use corresponds to buildings, while their fossil-fuel heating represents a major share. Therefore, in the near future, the built environment in Europe needs to be designed, built and renovated with much higher energy efficiency. In order to achieve the objectives of the Energy Policy for Europe adopted early in 2007 and to contribute through Energy-efficient Buildings to the 20% reduction of energy consumption, 20% use of Renewable Energy Sources and 20% reduction of CO₂ emissions, a strong and continued effort in RTD and innovation in the short, medium and long term is needed.

The objective of the *Energy-efficient Buildings PPP Initiative* is to deliver, implement and optimise building and district concepts that have the technical, economic and societal potential to drastically reduce energy consumption and decrease CO₂ emissions, both in relation to new buildings and to the renovation of existing buildings. This new initiative should have a large payoff, as it will increase the market for energy-efficient, clean and affordable buildings. Research priority will be given to delivering new building materials and components for energy saving and energy generation, thermal energy storage systems, advance insulation systems, thermal distribution systems, lighting technologies, windows and glazing technologies, energy generation systems based on renewable sources, but also to reliable simulation and prediction tools, including assessment methods that integrate economical, social and environmental issues, including comfort and safety. To date, the construction industry has failed to effectively integrate key technologies into its operations in order to achieve sustainable, long-term competitiveness.

The aim of the activities is to identify, through the partnership with industry, the main RTD needs, and address a number of areas of clear industrial interest, such as tools, the building envelopes, systems and equipment, ICTs for energy efficiency, environmental technologies, social and behavioural aspects, standardisation and business models. Specific deliverables expected for new and refurbished buildings (including cultural heritage) are:

- Research for new design and manufacturing technologies, focussing on materials and components, thermal energy storage systems, advanced insulation systems, thermal distribution systems, lighting technologies, windows and glazing technologies, and assessment methods and tools which include guidelines/methodologies for the eco-design and the Life Cycle Assessment of energy-efficient buildings.
- Research on ICT for energy efficiency in buildings, such as design and simulation tools, inter-operability/standards, building management systems, smart metering and user-awareness tools.
- Research for systemic, optimised and validated coherent set of solutions for all categories of existing buildings and climate in Europe.
- Research on resource efficiency (waste and energy use) to identify best practices to help set standards and establish public policies for higher energy efficiency and reduced environmental impact.
- Research on the application of technological, design and organisational improvements at district-level with the aim of reducing the energy and resource consumption.
- Research-related activities on key demonstration topics concerning integration of innovative products and systems, grid issues and business models.

II.5.2.1 "Energy-efficient Buildings (EeB)" - Topics covered by the NMP Theme:

EeB.NMP.2011-1 Materials for new energy efficient building components with reduced embodied energy

Technical content/scope: When increasing the level of energy performance of buildings in operation, embodied energy in materials may represent a high percentage of the energy spent in the whole life cycle of a building. Therefore, the development of new multifunctional materials is needed, having a low embodied energy and also higher thermal and acoustic properties (embodied energy is often proportional to mass), overcoming scarcity of renewable materials. New approaches combining novel processes, sensors and material science should help to minimize the embodied energy of main construction materials involved in new energy efficient building components. Solutions for reducing the embodied energy and/or CO₂ of building materials are needed and this will necessitate the further development of innovative new approaches to materials and the materials life cycle that have the potential to go beyond the current state of the art. Moreover, not only a better understanding and application of a particular material is needed, but also the understanding and optimisation of material combinations and their synergistic function, hence blurring the distinction between a material and a functional device comprised of distinct materials. New technology routes to integrate waste in the production cycle (recycling) of new materials are needed.

Research proposals should address materials for building components with reduced embodied energy and should be strongly focused on the final performance properties rather than on the individual material performance. At least one fully operational component should be delivered at

the end of the research project. Where appropriate, proposals should also address specific environment, health and safety research and/or assessment. Specific consideration can be given to standardisation issues. Dedicated modelling and/or the production of (certified) reference materials can be also addressed, as an integrated part of the research proposal. The proposed solutions should be based on a responsible, sustainable and environmentally friendly approach. The environmental sustainability of each developed solution shall be assessed via life cycle assessment studies carried out according to the International Reference Life Cycle Data System (ILCD) Handbook. In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners, including SMEs, represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact. The participation of public authorities may also be considered.

Funding scheme: Large-scale integrating collaborative Projects.

Expected impact: (i) Reduction by at least 50% of the embodied energy at component level compared to the 2005 values; (ii) Reduction by at least 15% of the total costs compared to existing solutions; (iii) The proposers should demonstrate and quantify the potential European impact on energy-efficiency at building level; (iv) Improved durability of the components resulting in less frequent replacement, so that the impact of embodied energy will be lower over the lifetime of the building; (v) Contribution to achieving EU policies.

EeB.NMP.2011-2 **New efficient solutions for energy generation, storage and use related to space heating and domestic hot water in existing buildings**

Technical content/scope: Space heating and domestic hot water represent the largest part of energy use in buildings today. New technologies and methods need to be developed to help reduce the energy consumption and environmental impact of buildings during their entire life-cycle, through specific efforts devoted to space heating and domestic hot water systems. The existing residential building stock is the main target.

Existing technologies are not yet fully suitable or sufficiently integrated to be applied widely within buildings or districts. Cost-effective solutions along the entire life cycle and suitable for retrofitting are necessary to ensure market acceptance. Integration of new reliable systems improving the comfort and combining energy collection (such as solar energy), energy storage, space heating, domestic hot water and/or energy waste capture should be developed. This will require new design tools, production concepts and solutions which are easy to install (e.g. kits, configurators), reducing maintenance efforts and simplifying logistics. In this framework, the involvement of the users and their behaviour is essential, since they are at the core of new SME-friendly business models to be investigated and deployed.

Holistic approaches, tackling multi-disciplinary developments in areas such as ventilation technologies, sensors, actuators, pervasive computing systems, embedded renewable energy sources, high efficient and more integrated heat pumps, compact solutions for enhanced energy storage capacities, waste energy recovery systems or solar heat-exchangers, leakage and air flow control should be considered. Deliverables should include the development, integration and proof of concept, prototypes or demonstrators, decision support systems and assessment tools of the above concepts, if possible according to the global strategy at district level (e.g. for social housing or residential buildings). In line with the global strategy, action at the district level should also remain a target. Measurement and analysis tools for existing and future energy performance are necessary to validate the developed technologies.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners will represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding scheme: Large-scale integrating collaborative projects.

Expected impact: A wide impact is expected from higher energy-efficient solutions for space heating and domestic hot water production, which contribute to around 50% of energy use in residential buildings. Holistic design of solutions for energy generation, storage and use should increase the overall efficiency by at least 30%. The proposers should also anticipate future targets for energy-efficient buildings.

EeB.NMP.2011-3 Energy saving technologies for buildings envelope retrofitting

Technical content/scope: Taking into account the very large existing building stock in Europe, retrofitting represents a major challenge and has the highest potential to transform existing and occupied buildings (commercial and residential) into energy-efficient buildings. There is a clear need to develop new technologies and strategies in this area to address energy efficiency with appropriate procedures and building techniques, while taking account of the social acceptance by the buildings' users and the return on investment. In general the envelope of the buildings is the most important element and has a high potential contribution to reducing energy demand.

The research shall focus on development of new materials, products, components, systems or coherent sets of solutions for the whole, or any part, of the building envelope. These systems can be new or an innovative combination of partially existing technologies combined with new ones. New enhanced multi-functional lightweight materials with lower heat transfer and high heat inertia and improved mechanical properties are also expected. Compatibility with existing building functions and aesthetics is a critical point, i.e. solutions adapted to existing buildings should be developed taking into account jointly reduced energy consumption and increased indoor comfort (noise, glare, moisture, etc.). Solutions should clearly contribute to reach energy saving targets for existing buildings in the short/medium term and should also be validated for all essential requirements. Standardisation aspects should be considered.

Production and assembly of these affordable solutions as well as their easy installation in a minimally intrusive way (e.g. advanced joining techniques) and their maintenance are other important aspects to be considered. Both societal acceptance and making wide-scale commercial application feasible are crucial. The safety of proposed solutions must also be ensured for the full product life cycle. In addition, the economic performance of the proposed solutions should be demonstrated by costing the service life. The re-use and/or recycling of building blocks and components removed during the renovation process, as well as the impact on the occupants and users should be considered.

The basement, roof and walls seem to be the key elements to be addressed, externally (for example by applying a new generation of façade elements) or internally (for example by applying new generation of insulation materials focusing on the best compromise between energy performance, investment cost, durability and ease of installation). The building structure is not the primary target.

In line with the global strategy, the district concept should also remain a target. Measurement and analysis tools for existing and future energy performance, fully exploiting the potential of remote data acquisition techniques, are also necessary to validate the developed technologies and demonstrate clear energy gains. The technologies developed should not hinder the future integration of renewable energy sources in the existing building stock.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners will represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

Funding scheme: Large-scale integration collaborative projects.

Expected impact: The proposers should demonstrate the possibility to reach at least the energy efficiency of new buildings according to current national regulations. This will result in clear

benefits both to owners and tenants. The return on investment should be kept below 7 years, taking into account that the establishment of effective cooperation among stakeholders in the value chain will increase overall efficiency and introduce economies of scale for large take-up. Non technological barriers should be properly addressed.

EeB.NMP.2011-4 Geo-clusters approach to support European energy-efficiency goals

Technical content/scope: Local practices and the operational framework concerning energy-efficient buildings differ widely across the EU. The situation depends often on regional preferences with regard to the processes, materials and technologies in use, as well as social and economic aspects. There is a need for a coordination action:

- To further investigate the geo-clusters concept conceived as virtual transnational areas/markets where strong similarities are found, for instance, in terms of climate or geography, culture and behaviour, construction typologies, economy and energy/resource pricing policies, GDP per capita, but also the types of technological solutions or building materials available. This requires the identification of those EU areas where the building stocks present such similarities.
- To create, in synergy with existing systems a repository of structured information on all EU wide services and tools in energy efficiency and construction, including indicators, best practices and experience with existing demonstrators as well as available technologies ready to be used in the existing building stock. These solutions should allow common EU standards and parameters to be defined, thus improving the relationship between the citizen and the energy aspect.
- To develop a technology map with a dynamic geo-database web service, based on the geo-clusters concept where different technologies and research challenges can be placed, in order to contribute to the development of appropriate business strategies and maximise the chances for a wider implementation of the technologies that can deliver a higher impact. Solutions should be assessed having in mind Least Life Cycle Costs (LLCC) in order to contribute to EU policies.

Methodology and developed tools to process acquired data, design, model, simulate and predict energy efficiency should take into account the buildings and the district dimension within each geo-cluster.

Funding scheme: Coordination and Support Action (coordination action)

Expected impact: The availability of an extensive set of validated data and indicators for key geographical areas will allow to properly define requirements and specifications for technology development and integration, as well as the fine tuning of demonstration actions in order to maximise impact. Non technological aspects will be instrumental for the full take-up of the geo-clusters concept and should be able to leverage the expected outcomes. The direct/indirect involvement of a wide range of stakeholders guided by a clear industrial vision and a comprehensive coverage of the industrial value chain in energy-efficient buildings.

II.5.3 "Green Cars (GC)" - Public-Private Partnership –

Cross-thematic cooperation between NMP, ICT, Environment (including Climate Change) and Transport (including Aeronautics)

The automotive industry is one of Europe's key industrial sectors, whose importance is largely derived from its linkages within the domestic and international economy and its complex value chain. It is estimated to account for close to 8% of total manufacturing value added (ca. EUR 120 billion, 2006) and about 6% of total manufacturing employment (over 2 million employees). The automotive industry also provides an indirect employment to 10-11 million persons and is one of the largest RTD investors in the EU with over EUR 20 billion annually (ca. 5% of its turnover)¹¹.

The foreseeable shortage in crude oil based energy carriers is driving fears about energy security: 73% of all oil consumed in Europe is used in transport and estimates predict a doubling of passenger cars within the next 20 years. From an environmental and energy point of view there is an urgent need to find alternatives to fossil fuels in order to secure future energy supply, to guarantee the availability of appropriate material recycling technologies, and to reduce greenhouse gas emissions and other potential environmental impacts related to the automotive industry entire life-cycle. It is thus increasingly evident that a particular emphasis should be put on the rapid development of technologies supporting the massive emergence of more efficient and sustainable road transport solutions based on alternative fuels/energy, and on the RTD efforts associated with them.

The '*European Green Cars*' PPP Initiative is a series of measures boosting research and innovation aiming at facilitating the deployment of a new generation of passenger cars, trucks and buses that will spare our environment and lives and ensure jobs, economic activity and competitive advantage to car industries in the global market. A series of different measures are proposed: support to research and innovation through FP7 funding schemes, specific EIB loans to the automotive and other transport industries and its suppliers, in particular for innovative clean road transport, and a series of legislative measures to promote the greening of road transport (circulation and registration taxes, scrapping of old cars, procurement rules, the CARS21 initiative).

Other actions that are very closely related to the '*European Green Cars*' Initiative but not formally included in it are being implemented, such as the '*Fuel Cell and Hydrogen*' (FCH) Joint Technology Initiative and the road transport projects funded under the FP7 Transport Theme.

The '*European Green Cars*' Initiative includes three major research and development avenues within its RTD pillar:

- **Research for heavy duty vehicles based on internal combustion engines (ICE)** [Sustainable Surface Transport sub-theme (SST)]: The research will primarily concentrate on advanced ICE with emphasis on new combustion, the use of alternative fuels (e.g. bio-methane), intelligent control systems, 'mild' hybridisation (use of recuperated electricity to power the auxiliary systems) and special tyres for low rolling resistance.
- **Research on electric and hybrid vehicles:** This component will be the most essential in this package. To have a real impact on the green economy, research in this field should no longer focus on electric vehicle technologies seen in isolation from the rest of the transport system: a massive introduction of the technology requires the availability of smart electricity grids and intelligent vehicle charging systems tailored to customers' needs.
- **Logistics and co-modality** combined with **intelligent transport system** technologies are essential to optimize the overall system efficiency and sustainability avoiding for example that empty trucks circulate on highways due to sub-optimal logistics. In this respect, smooth and co-operative interactions between the different transport modes will be essential.

The 2011 Work Programme focuses on the second research avenue: electric and hybrid vehicles and their infrastructures. Three groups of topics covering collaborative research activities as well as coordination and support actions are included:

¹¹ "European industry – a sectoral overview, 2006 update, EC-DG ENTR

- Materials, technologies and processes for sustainable automotive electrochemical storage applications, implemented through a call jointly implemented with other Themes.
- Research on electric and hybrid vehicles, implemented through the Sustainable Surface Transport (SST) sub-theme of the Transport Theme.
- Information and Communication Technologies for the fully electric vehicle, implemented through the ICT Theme.

"Green Cars" (GC) – Topic implemented jointly by NMP, Transport (including Aeronautics) and Environment (including Climate Change) Themes

The call is implemented jointly by the NMP, Transport and Environment Themes. The indicative budget of the NMP part for this "Green cars" PPP initiative is EUR 10 million in 2011, with the Transport Theme contributing also EUR 10 million, and the Environment Theme contributing EUR 5.5 million. The European Union funding part of the indicative budget of the Call is thus EUR 25.5 million.

GC.NMP.2011-1 Advanced eco-design and manufacturing processes for batteries and electrical components.

Content/scope: Further development and deployment of electrical vehicles call for large scale production of batteries and electrical components with good performances and at the lowest possible cost. Research shall address the whole value chain including the eco-design, assembly/integration and production of batteries and electrical components (motors, battery management systems, etc.). Eco-design should properly account for the relevant dismantling, recycling/disposal, and health and safety aspects of critical materials.

- For near-to-market types of lithium-based batteries, projects should focus on manufacturing processes of cells but also on their integration into manageable battery modules and packs. Advanced manufacturing processes of battery cells, should be flexible enough or reconfigurable to cope with new chemistries. Special attention should be devoted to thermal management systems and safety issues, which are critically dependant on battery system design.
- For electric drivetrains and in particular motors, the main challenge of cost reductions is to be achieved by design improvements in order to produce lighter systems with increased power density, while at the same time taking into account the availability of critical materials and their dismantling/recycling. Projects should not include design or manufacturing of the power chips themselves.

For a significant industrial benefit, it should be possible to integrate the advanced manufacturing tools, methodologies and processes developed within the project into conventional or already existing production lines or, in case of new architectures, include new methodologies. In both cases the projects are expected to cover small-scale production-line demonstrators. The environmental improvements achieved should be proven via ILCD-conform Life Cycle Assessment. The feasibility of the dismantling/recycling process for motors should be proven at least at bench/pilot scale for the most critical materials. In order to ensure the industrial relevance and impact of the research effort, active participation of industrial partners, including SMEs, components suppliers, electrical vehicle manufacturers and component recyclers, represent an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

The work should be complementary to the objective GC-ICT-2011.6.8 'ICT for fully electric vehicles'.

Funding Scheme: Large-scale integrating collaborative projects.

Additional eligibility criterion: The EU contribution requested must be greater than EUR 4 million.

Expected impact: Establishing the basis for a world level European automotive battery and electrical components manufacturing industry. In particular production of cells, battery packs, electrical motors and components with the required performances at competitive costs. Reduction of waste production and improvement of resource efficiency through a more efficient recycling of critical materials.

III. IMPLEMENTATION OF CALLS

III.1 Calls for proposals NMP-2011

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – LARGE 2011

- **Call identifier:** *FP7-NMP-2011-LARGE-5*
- **Date of publication**¹²: 20 July 2010
- **Deadline**¹³: For Large-scale integrating Collaborative Projects - first stage: 4 November 2010 at 17.00.00 (Brussels local time)
- **Indicative budget: EUR 118 million**¹⁴. The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Maximising the contribution of nanotechnology to sustainable development	NMP.2011.1.1-1 Smart and multifunctional packaging concepts utilizing nanotechnology	<i>Large-scale integrating Collaborative Projects</i>
Nanotechnology for benefiting environment, energy and health	NMP.2011.1.2-2 New targeted therapy using nanotechnology for transport of macro-molecules across biological barriers	
Cross-cutting and enabling R&D	NMP.2011.1.4-1 Large-scale green and economical synthesis of nanoparticles and nanostructures	
	NMP.2011.1.4-2 Development of nano-scale detection and control techniques for large area substrates	
Innovative materials for advanced applications	NMP.2011.2.2-1 Novel superconducting materials, architectures and processes for electrotechnical applications	
Rapid transfer and integration of new technologies into the design and operation of manufacturing processes	NMP.2011.3.4-1 Eco-efficient management of industrial water	
Integration of technologies for industrial applications	NMP.2011.4.0-1 New technologies based on physical processing of materials for mechanical or electro-technical applications	
	NMP.2011.4.0-2 Advanced underground technologies for intelligent mining and for inspection, maintenance and excavation	

¹² The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

¹³ The Director-General responsible may delay this deadline by up to two months.

¹⁴ Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority

• **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

For Large scale integrating Collaborative Projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.

The eligibility criteria apply to both first and second stage proposals. At stage 1, only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds, while part B will be used to check the number of eligible participants. At stage 2, part A will be used alone to determine these eligibility conditions.

The following additional eligibility criteria apply in this call: for Large scale integrating Collaborative Projects **the EU funding requested must be greater than EUR 4 million**. Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

• **Evaluation procedure:**

For Large scale integrating Collaborative Projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (A4 pages; font size 11 points; top, bottom, left right margins: 15mm) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS. The Commission will instruct the experts to disregard any pages exceeding these limits.

Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative deadline is: **28 April 2011**. Experts will carry out the individual evaluation of proposals remotely.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- **Evaluation criteria and thresholds for stage 1 proposals:**

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- Evaluation criteria and thresholds for stage 2 proposals:

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	4/5
Overall threshold required	12/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

In contrast with Annex 2 of the work programme, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage. A reserve list of proposals may be established.

- **Indicative timetable:**

Evaluation Stage 1 proposals: November/December 2010; Evaluation stage 2 proposals: May-June 2011. Evaluation results: estimated to be available within two months after the call deadline.

- **Consortium agreements:**

Participants are required to conclude a consortium agreement.

- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 to this work programme.

- **Use of flat rates for subsistence costs**

In accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – SMALL 2011

- **Call identifier:** *FP7-NMP-2011-SMALL-5*
- **Date of publication**¹⁵: 20 July 2010
- **Deadline**¹⁶: For Small or medium-scale focused research projects - first stage: 4 November 2010 at 17.00.00 (Brussels local time)
- **Indicative budget: EUR 99.50 million**¹⁷. The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Nanotechnology for benefiting environment, energy and health	NMP.2011.1.2-3 Active nanomembranes/-filters/-adsorbents for efficient water treatment with stable or regenerable low-fouling surfaces	<i>Small or medium-scale focused research projects</i>
Ensuring the safety of Nanotechnology	NMP.2011.1.3-2 Worker protection and exposure risk management strategies for nanomaterial production, use and disposal	
Cross-cutting and enabling R&D	NMP.2011.1.4-4 Nanotechnology based implantable and interfaceable devices	
Enabling research and development	NMP.2011.2.1-2 Modelling of ultrafast dynamics in materials	
Innovative materials for advanced applications	NMP.2011.2.2-2 Biomaterials for tissue engineering for age-related cancer and sensory organ diseases	
	NMP.2011.2.2-3 Materials for solid state lighting	
	NMP.2011.2.2-4 Novel materials for replacement of critical materials (platinum group metals and rare earths)	
Structuring actions	NMP.2011.2.3-1 Advanced packaging materials from renewable biogenic resources (SICA)	
Development and validation of new industrial models and strategies	NMP.2011.3.1-1 Eco-design for new products	
Adaptive production systems	NMP.2011.3.2-1 Modelling and control of intensified process systems	

¹⁵ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

¹⁶ The Director-General responsible may delay this deadline by up to two months.

¹⁷ Under the condition that the draft budget for 2011 is adopted without modifications by the budget authority.

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Funding scheme	Minimum conditions
Collaborative Project	At least 3 independent legal entities, each of which is established in a MS or AC, and no 2 of which are established in the same MS or AC
Collaborative project for specific cooperation Action (SICA) dedicated to international cooperation partner countries	At least 4 independent legal entities. Of these, 2 must be established in different MS or AC. The other 2 must be established in different international cooperation partner countries (ICPC).

In addition to the general eligibility criteria, which are given in Annex 2 to the work programme, for Small or medium-scale focused research projects, **the EU funding requested must not exceed EUR 4 million**. Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

The following topic has additional eligibility criteria:

- **NMP.2011.2.3-1 Advanced packaging materials from renewable biogenic resources (SICA):** this is a Specific International Co-operation Action (SICA) targeted to Latin America countries, for which the minimum participation is of at least 4 independent legal entities, of which two must be established in different Member States or Associated Countries and the other two must be established in different targeted regions/countries of Latin America.

The eligibility criteria apply to both first and second stage proposals. At stage 1, only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds, while part B will be used to check the number of eligible participants. At stage 2, part A will be used alone to determine these eligibility conditions

- **Evaluation procedure:**

For Small or medium-scale focused research projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (A4 pages; font size 11 points; top, bottom, left right margins: 15mm) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS. The Commission will instruct the experts to disregard any pages exceeding these limits.

Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative deadline is: **28 April 2011**. Experts will carry out the individual evaluation of proposals remotely.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- Evaluation criteria and thresholds for stage 1 proposals:

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- Evaluation criteria and thresholds for stage 2 proposals:

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	3/5
Overall threshold required	12/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

See also Annex 2: Eligibility and evaluation criteria for proposals.

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage. A reserve list of proposals may be established.

- **Indicative evaluation and contractual timetable:** Evaluation Stage 1 proposals: November/December 2010; Evaluation stage 2 proposals: May-June 2011. Evaluation results: estimated to be available within two months after the call deadline.
- **Consortium agreements:** Participants are required to conclude a consortium agreement.
- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 to this work programme.
- **Use of flat rates for subsistence costs**

In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies - SMEs

- **Call identifier:** *FP7-NMP-2011-SME-5*
- **Date of publication**¹⁸: 20 July 2010
- **Deadline**¹⁹: For SME-targeted Collaborative Projects - first stage: 4 November 2010 at 17.00.00 (Brussels local time)
- **Indicative budget: EUR 40 million**²⁰. The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Ensuring the safety of Nanotechnology	NMP.2011.1.3-1 New methods for measuring, detection and identification of nanoparticles in products and/or in the environment	<i>SME-targeted Collaborative Projects</i>
Cross-cutting and enabling R&D	NMP.2011.1.4-3 Tools and methodologies for imaging structures and composition at the nanometre scale	
Enabling Research and Development	NMP.2011.2.1-1 Research and innovation for advanced multifunctional ceramic materials	
Integration of technologies for industrial applications	NMP.2011.4.0-3 Advanced textiles for the energy and environmental protection markets	

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

For SME targeted Collaborative Projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country. Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

The eligibility criteria apply to both first and second stage proposals. At stage 1, part B will be used to check the number of eligible participants. At stage 2, part A will be used alone to determine these eligibility conditions.

- **Additional eligibility criterion**

SME-targeted Collaborative Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 35% or more of the total estimated EU contribution. ***This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.***

- **Evaluation procedure:**

¹⁸ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

¹⁹ The Director-General responsible may delay this deadline by up to two months.

²⁰ Under the condition that the draft budget for 2011 is adopted without modifications by the budget authority.

For SME targeted projects the evaluation shall follow a two-stage procedure. The first stage proposal, of a maximum of 10 pages (A4 pages; font size 11 points; top, bottom, left right margins: 15mm) should focus on the S&T content and on clear identification of the intended results, their intended use and the expected impact (economic, social, environmental, etc.) and 2 additional pages to describe the consortium and the estimated financial resources involved. Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS. The Commission will instruct the experts to disregard any pages exceeding these limits.

Stage 1 proposals will be evaluated remotely. Stage 1 proposals shall be submitted at the closure date mentioned above. Coordinators of retained proposals in stage 1 ('go' proposals) will be invited to submit a complete proposal that will be then evaluated against the entire set of evaluation criteria. The closure date of the second submission will be specified in the invitation to submit the complete proposal. The indicative deadline is: **28 April 2011**. Experts will carry out the individual evaluation of proposals remotely.

For this call, implemented via a two stage procedure, the following criteria and thresholds are applied:

- Evaluation criteria and thresholds for stage 1 proposals

Stage 1 proposals are evaluated on the basis of the following two criteria: **S/T quality and Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Impact	3/5
Overall threshold required	8/10

- Evaluation criteria and thresholds for stage 2 proposals

Stage 2 proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	4/5
Implementation	3/5
Impact	3/5
Overall threshold required	12/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage. A reserve list of proposals may be established.

• **Indicative evaluation and contractual timetable:**

Evaluation Stage 1 proposals: November/December 2010; Evaluation stage 2 proposals: May-June 2011. Evaluation results: estimated to be available within two months after the call deadline.

• **Consortium agreements:** Participants are required to conclude a consortium agreement.

- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3.
- Use of flat rates for subsistence costs:

In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – CSAs

- **Call identifier:** *FP7-NMP-2011-CSA-5*
- **Date of publication**²¹: 20 July 2010
- **Deadline**²²: For Coordination and Support Actions: 1 February 2011 at 17.00.00 (Brussels local time)
- **Indicative budget: EUR 12 million**²³ The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes
Ensuring the safety of Nanotechnology	NMP.2011.1.3-3 Intelligent testing strategies for nanomaterials impact and exposure – towards regulation and clustering of materials – supporting actions	<i>Coordination and support actions</i>
	NMP.2011.1.3-4 European platform on Nano Outreach and Dialogue (NODE) – supporting actions	
Structuring actions	NMP.2011.2.3-3 Networking of materials laboratories and innovation actors in various industrial sectors for product or process innovation – coordinating actions	
Integration of technologies for industrial applications	NMP.2011.4.0-4 Organisation of events related to the Presidencies of the European Union – supporting actions	
	NMP.2011.4.0-5 Support to Networks of Excellence with durable integrated structures – supporting actions	
	NMP.2011.4.0-8 NCP trans-national activities – coordinating actions	

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

- Coordination and support actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same MS or AC;

- Coordination and support actions – **supporting actions**: at least 1 independent legal entity.

The following topics have additional eligibility criteria:

- **NMP.2011.4.0-5 Support to Networks of Excellence with durable integrated structures**: the maximum EU funding requested per proposal must not exceed EUR 500 000.

²¹ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

²² The Director-General responsible may delay this deadline by up to two months.

²³ Under the condition that the draft budget for 2011 is adopted without modifications by the budget authority.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage. A reserve list of proposals may be established.

- **Evaluation procedure:**

For Coordination and Support Actions the evaluation shall follow a single stage procedure. The evaluation criteria and scoring scheme are set out in annex 2 of the work programme.

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through EPSS.

- **Indicative evaluation and contractual timetable:** Evaluation: February 2011. Evaluation results: estimated to be available within two months after the call deadline. A reserve list of proposals may be established.

- **Consortium agreements:** Participants are encouraged but not required to conclude a consortium agreement.

- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – NMP-Environment call

- **Call identifier:** FP7-ENV-NMP-2011
- **Date of publication**²⁴: 20 July 2010
- **Deadline**²⁵: 16 November 2010 at 17.00.00, Brussels local time
- **Indicative budget**^{26 27}: **EUR 12 million** of which: EUR 6 million from Theme 6 – (Environment, including Climate Change) and EUR 6 million from Theme 4 – NMP (Nanosciences, Nanotechnologies, Materials and New Production Technologies)

The budget for this call is indicative. The final budget awarded to actions implemented through this call for proposals may vary:

- The final budget of the call may vary by up to 10% of the total value of the indicated budget for this call.
- Any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

In case the budget cannot be consumed (totally or partially), the remaining budget will be returned to each FP7 Theme according to its respective contribution.

- **Topic called:**

THEME/ACTIVITY	TOPIC CALLED	FUNDING SCHEME
ENV.2011.3.2.1.-1	Development of advanced compatible materials and techniques and their application for the protection, conservation and restoration of cultural heritage assets	<i>SME-targeted Collaborative Projects</i>
NMP.2011.2.2-5		

The topic is evaluated and implemented jointly with Theme 6 (Environment, including Climate Change). It is identical to both themes. Hence each proposal must be submitted only once, either for topic ENV.2011.3.2.1-1, or topic NMP.2011.2.2-5, but not both. When applying for this call please use only one of the activity codes above.

Eligibility conditions

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

²⁴ The Director General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

²⁵ The Director-General responsible may delay this deadline by up to two months.

²⁶ Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority.

²⁷ A reserve list will be constituted if there is a sufficient number of good quality proposals. It will be used if extra budget becomes available.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

Additional eligibility criteria:

Under this topic, **the requested EU contribution must not exceed EUR 3 million.**

SME-targeted Collaborative Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 35% or more of the total estimated EU contribution. ***This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.***

- **Evaluation procedure:**

For this call the evaluation shall follow a single-stage evaluation procedure.

Proposals will not be evaluated anonymously.

Proposals will be evaluated remotely with the consensus session being held in Brussels.

At the Panel stage, proposals with equal overall scores will be prioritised according to their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion, and if proposals are again still tied, they will be prioritised in order to ensure the best coverage of the topic.

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of 0.5 point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T Quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

In order to ensure an efficient implementation and maximum impact of SME-related activities, the following aspects will be evaluated under the criteria Implementation and Impact:

- the level of SME involvement: although the coordinator does not need to be an SME, the participating SMEs should have significant participation in the project management;
- the output should be for the benefit of SME-dominated communities.

- **Forms of grants and maximum reimbursement rates**

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Consortium agreements**

Participants are required to conclude a consortium agreement.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for

indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Title: Call implemented jointly by Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies and Theme 5 - ENERGY

- **Call identifier: FP7-NMP-ENERGY-2011**
- **Date of publication²⁸:** 20 July 2010
- **Deadline²⁹:** 25 November 2010 at 17.00.00 (Brussels local time)
- **Indicative budget^{30 31}:** **EUR 25 million** of which EUR 15 million from Theme 4 – NMP and EUR 10 million from Theme 5 – Energy.
- **Topic called:**

THEME/ACTIVITY	TOPIC IDENTIFIER	FUNDING SCHEME
ACTIVITY 4.1: NANOSCIENCES AND NANOTECHNOLOGIES		<i>Large-scale integrating Collaborative Projects</i>
NMP.2011.1.2-1	Development and up-scaling of innovative photovoltaic cell processes and architectures to pilot-line scale for industrial application	
ACTIVITY ENERGY.2: RENEWABLE ELECTRICITY GENERATION		
ENERGY.2011.2.1-2	Development and up-scaling of innovative photovoltaic cell processes and architectures to pilot-line scale for industrial application	

The topic is evaluated and implemented jointly with Theme 5 (ENERGY). It is identical to both themes. Hence each proposal must be submitted only once, either for topic **NMP-2011.1.2-1** or topic **ENERGY.2011.2.1-2**, but not both. When applying for this call please use only one of the activity codes above.

- **Eligibility conditions:**

For Large-scale integrating Collaborative Projects the minimum conditions to participate are: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.

In addition to the general eligibility criteria, which are given in Annex 2 to the work programme, for the Large-scale integrating collaborative projects, the EU funding requested **must be greater than EUR 4 million**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the real work to be carried out in the project.

²⁸ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

²⁹ The Director-General responsible may delay this deadline by up to two months.

³⁰ The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.

³¹ Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority.

- **Evaluation procedure:**

A single-stage submission procedure will be followed. Proposals may be evaluated remotely.

The evaluation criteria (including thresholds) and sub-criteria together with the eligibility, selection and aware criteria for the different funding schemes are set out in annex 2 to this work programme.

In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

A reserve list will be constituted if there is a sufficient number of good quality proposals. It will be used if extra budget becomes available.

- **Indicative evaluation and contractual timetable:**

Evaluations are expected to be carried out during the months of January/February 2011. It is expected that the contract negotiations for the short-listed proposals will be opened in March 2011.

- **Forms of grant and maximum reimbursement rates** for projects funded through the Cooperation work programme are given in Annex 3 of this work programme.

- Use of flat rates for subsistence costs:

In accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – Coordinated call EU-Russia 2011

- **Call identifier:** *FP7-NMP-2011-EU-RUSSIA*
- **Date of publication:**³² 20 July 2010
- **Deadline**³³: 31 March 2011 at 17.00.00 (Brussels local time).
- **Indicative budget:** **EUR 4.5 Million**³⁴ by EU - NMP Theme. The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call. The Russian Authorities have announced a corresponding equivalent funding from the Russian Ministry of Education and Science.
- **Topic called:**

Activity/Area	Topics	Indicative budget (EUR mio)	Funding Scheme
NMP.2011.1.4-5 Multiscale Modelling as a tool for Virtual Nanotechnology Experimentation	<i>a. Theoretical analysis, design and functional virtual testing of hetero or hybrid nanostructured elements for use in smart systems, integrated systems, OLEDs, photo-voltaics or energy saving applications</i>	1.5	<i>Small or medium-scale focused research projects</i>
	<i>b. Theoretical analysis, design and functional virtual testing of organic matrix nanocomposites for industrial applications (including optical electrical and mechanical properties).</i>	1.5	
	<i>c. Theoretical analysis, design and functional virtual testing of behavioural features (e.g. biocompatibility and mechanical properties) of biocompatible, metallic nanomaterials.</i>	1.5	

The coordinated call EU-Russia foresees twin projects to be financed by the European Union and the Russian funding agency respectively. Two calls are published – one by the European Commission according to European rules and the other by the Russian Authorities under its own rules.

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

For Small-scale focused research projects, the minimum conditions to participate are: at least three independent legal entities, each of which is established in a Member State or Associated Country, and not two of which are established in the same Member State or Associated Country.

- **Additional eligibility criteria:**

Proposals which do not include coordination with a Russian project will be considered ineligible. Therefore, each EU project proposal must include (in a separate annex) reference and description of

³² The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

³³ The Director-General responsible may delay this deadline by up to two months.

³⁴ Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority.

the proposal submitted for funding to the Russian Ministry of Education and Science. Proposals will only be evaluated on the condition that the corresponding coordinated Russian project proposal(s) also is presented for funding to the Russian Ministry of Education and Science.

The EU funding requested **must not exceed EUR 1.5 million**.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the actual work to be carried out in the project. Proposals must be submitted by using the European Commission Electronic Proposal Submission Service (EPSS) available on CORDIS at www.cordis.europa.eu.

Only information provided in Part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

- **Evaluation procedure**

For this call, the evaluation shall follow a single-stage procedure. The proposals will be evaluated by a panel which may also include Russian experts.

- **Evaluation criteria and thresholds**

The evaluation criteria and sub-criteria to be applied to this coordinated call are given in Annex 2 to this work programme.

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

In order to ensure a genuine EU-Russia cooperation, a balanced effort between the coordinated projects and a research plan properly involving coordinated research activities between Europe and Russia represent an added value to the activities and this will be reflected in the evaluation, under the criteria Impact and Implementation.

In terms of reciprocity, non confidential abstracts of EU retained proposals will be made available to the Russian authorities.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Additional selection criterion**

Proposals will only be selected on the condition that their coordinated Russian project(s) will be funded by the Russian Ministry of Education and Science.

Only one proposal per topic will be funded under this call: that is one proposal for each one of the three topics (a, b, c) implemented via Small or medium scale focused research projects.

- **Indicative evaluation and contractual timetable**

Evaluation: May 2011; Evaluation results: estimated to be available within three months after the call deadline. A reserve list of proposals may be established. Negotiations will be carried out in parallel by the EU and the Russian Ministry of Education and Science in order to have a simultaneous start of the respective grant agreements.

- **Consortia and coordination agreements**

Participants are requested to conclude a consortium agreement. In addition, participants in the EU projects are required to conclude a coordination agreement with the participants in the coordinated project funded by the Russian Ministry of Education and Science. A final draft of these agreements has to be provided with the proposal.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Call Title: Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies – Coordinated call EU-Japan 2011

- **Call identifier:** *FP7-NMP-2011-EU-Japan*
- **Date of publication:**³⁵ 20 July 2010
- **Deadline**³⁶: 17 November 2010 at 17.00.00 (Brussels local time).
- **Indicative budget: EUR 5 Million**³⁷ by EU - NMP Theme. The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call. An equivalent budget for the call is expected from the Japan Science and Technology Agency.
- **Topic called:**

Activity/Area	Topics	Funding Scheme
Innovative materials for advanced applications	NMP.2011.2.2-6 Fundamental properties of novel superconducting materials	<i>Small or medium-scale focused research projects</i>

The coordinated call EU-Japan foresees twin projects to be financed by the European Union and by the Japanese funding agency respectively. Two calls are published – one by the European Commission according to European rules and the other by the Japan Science and Technology Agency under its own rules.

- **Eligibility conditions:**

The coordinated call on the topic above is launched by the EU (this call) and the Japan Science and Technology Agency, each according to their respective rules.

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

For Small-scale focused research projects, the minimum conditions to participate are: at least three independent legal entities, each of which is established in a Member State or Associated Country, and no two of which are established in the same Member State or Associated Country.

- **Additional eligibility criteria:**

Proposals which do not include coordination with a Japanese project will be considered ineligible. Therefore, each EU project proposal must include (in a separate annex) reference and description of the proposal submitted for funding to the Japan Science and Technology Agency. Proposals will only be evaluated on the condition that the corresponding coordinated Japanese project proposal(s) also is presented for funding to Japan Science and Technology Agency .

The EU funding requested **must not exceed EUR 1.8 million**.

Proposals must be submitted by using the European Commission Electronic Proposal Submission Service (EPSS) available on CORDIS at www.cordis.europa.eu.

³⁵ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

³⁶ The Director-General responsible may delay this deadline by up to two months.

³⁷ Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority.

Only information provided in Part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

Please note that the financial resources mobilised within a project will be assessed during the evaluation against the actual work to be carried out in the project.

- **Evaluation procedure**

For this call, the evaluation shall follow a single-stage procedure. The proposals will be evaluated by a panel which may also include Japanese experts.

- **Evaluation criteria and thresholds**

The evaluation criteria and sub-criteria to be applied to this coordinated call are given in Annex 2 to this work programme.

Proposals are evaluated on the basis of the following three criteria: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

In order to ensure a genuine EU-Japan cooperation, a balanced effort between the coordinated projects and a research plan properly involving coordinated research activities between Europe and Japan represent an added value to the activities and this will be reflected in the evaluation, under the criteria Impact and Implementation.

In terms of reciprocity, non confidential abstracts of EU retained proposals will be made available to the Japan Science and Technology Agency.

See also Annex 2: Eligibility and evaluation criteria for proposals

In contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

- **Additional selection criterion**

Proposals will only be selected on the condition that their coordinated Japanese project(s) will be funded by the Japan Science and Technology Agency.

- **Indicative evaluation and contractual timetable**

Evaluation: January/February 2011. Evaluation results: estimated to be available by April 2011. A reserve list of proposals may be established. Negotiations will be carried out in parallel by the EU and the Japan Science and Technology Agency. A fixed start date of October 1st 2011 of the respective grant agreements is targeted.

- **Consortia and coordination agreements**

Participants are requested to conclude a consortium agreement. In addition, participants in the EU projects are required to conclude a coordination agreement with the participants in the coordinated project funded by the Japan Science and Technology Agency. A final draft of these agreements has to be provided with the proposal.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

III.2 Calls for proposals Public-Private Partnerships

Public-Private Partnership "Factories of the Future" - Cross-Thematic call implemented between NMP and ICT

Call title: "Factories of the Future" - 2011

- **Call identifier:** FP7-2011-NMP-ICT-FoF
- **Date of publication:** 20 July 2010³⁸
- **Deadline:** 2 December 2010³⁹ at 17.00.00 (Brussels local time).
- **Indicative budget**^{40 41}: EUR 160 million from the 2011 budget of which:
 - EUR 80 million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies
 - EUR 80 million from Theme 3 – Information and Communication Technologies (ICT)
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes	Budget (Million EUR)
NMP – Nanosciences, nanotechnologies, Materials and new Production			
FoF.NMP.2011-1	The Eco-factory: cleaner and more resource-efficient production in manufacturing	<i>Collaborative Projects (Large-scale projects)</i>	80
FoF.NMP.2011-2	Cooperative machines and open-architecture control systems	<i>Collaborative Projects (small or medium-scale focused research project)</i>	
FoF.NMP.2011-3	Robots for automation of post-production and other auxiliary processes	<i>Collaborative Projects (small or medium-scale focused research project)</i>	
FoF.NMP.2011-4	High-tech solutions in the production processes for customised green, safe and healthy consumer products	<i>SME-targeted collaborative projects</i>	

³⁸ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

³⁹ The Director-General responsible may delay this deadline by up to two months

⁴⁰ The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- the final budget of the call may vary by up to 10% of the total value of the indicated budget for the call; and
- any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call

⁴¹ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority

FoF.NMP.2011-5	Towards zero-defect manufacturing	<i>Collaborative Projects (Large-scale projects)</i>	
FoF.NMP.2011-6	Manufacturing chains for nano-phased component and coatings	<i>Collaborative Projects (Large-scale projects)</i>	
ICT – Information and Communication Technologies			
FoF-ICT-2011.7.3	Virtual Factories and enterprises	<i>Collaborative Projects (IP and STREP)</i>	80
FoF-ICT-2011.7.4	Digital factories: Manufacturing design and product lifecycle management a) and b) targeted outcomes	<i>Collaborative Projects (IP and STREP)</i>	
FoF-ICT-2011.7.4	Digital factories: Manufacturing design and product lifecycle management c) targeted outcome	<i>Collaborative Projects (IP and STREP) & Coordination and Support Actions (CSA)</i>	

- **Eligibility conditions:**

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and Support Actions, the minimum conditions shall be:

- Coordination and Support Actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.
- Coordination and Support Actions – **supporting actions**: at least 1 independent legal entity.

- **Additional eligibility criteria**

For the following topics, implemented via large scale projects: the **EU funding requested must be greater than EUR 4 million**:

- **FoF.NMP.2011-1** The eco-factory: cleaner and more resource-efficient production in manufacturing;
- **FoF.NMP.2011-5** Towards zero-defect manufacturing;
- **FoF.NMP.2011-6** Manufacturing chains for nano-phased.

For the topics: **FoF.NMP.2011-2** Cooperative machines and open-architecture control systems and **FoF.NMP.2011-3** Robots for automation of post-production and other auxiliary processes, implemented via small and medium scale focused research projects have specific eligibility criteria: the **EU funding requested must not exceed EUR 4 million**.

For the topic: **FoF.NMP.2011-4** High-tech solutions in the production processes for customised green, safe and healthy consumer products, implemented via SME targeted collaborative projects: SME-targeted Collaborative Projects will only be selected for funding on the condition that the estimated EU contribution going to SME(s) is 35% or more of the total estimated EU contribution. ***This will be assessed at the end of the negotiation, before signature of the grant agreement. Proposals not fulfilling this criterion will not be funded.***

For the ICT topics, each proposal must indicate the type of funding scheme used (IP or STREP for Collaborative Projects where applicable; CA or SA for Coordination and Support Actions). See Appendix 2 to the ICT chapter of the Cooperation work programme for further details.

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

Each Theme will remain responsible for its own budget and for the implementation of the respective call topics. This includes drawing up ranking lists per Theme and subsequent negotiation and follow-up of the grant agreements resulting from proposals selected under the respective call topics.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

See also Annex 2: Eligibility, Evaluation criteria for proposals and priority order for proposals with the same score⁴².

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

Evaluation of proposals: January 2011. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of March 2011.

- **Consortium agreements**

⁴² For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

Consortium agreements are required for *all* actions.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs:**

For topics FoF.NMP.2011-1, FoF.NMP.2011-2, FoF.NMP.2011-3, FoF.NMP.2011-4, FoF.NMP.2011-5, FoF.NMP.2011-6 and in accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Public-Private Partnership "Energy-efficient Buildings" – Cross-Thematic call implemented between NMP, ICT, ENERGY, and ENVIRONMENT (including Climate Change)
Call title: "Energy-efficient Buildings" - 2011

- **Call identifier:** FP7-2011-NMP-ENV-ENERGY-ICT-EeB
- **Date of publication:** 20 July 2010⁴³
- **Deadline:** 2 December 2010⁴⁴ at 17.00.00 (Brussels local time).
- **Indicative budget**^{45 46}: EUR 85.5 million from the 2011 budget of which:
 - EUR 40 million from Theme 4 – Nanosciences, Nanotechnologies, Materials & New Production Technologies
 - EUR 20 million from Theme 3 – Information and Communication Technologies (ICT)
 - EUR 20 million from Theme 5 – Energy
 - EUR 5.5 million from Theme 6 – Environment (including Climate Change)
- **Topics called:**

Activity/ Area	Topics called	Funding Schemes	Budget (Million EUR)
NMP – Nanosciences, nanotechnologies, Materials and new Production			
EeB.NMP.2011-1	Materials for new energy efficient building components with reduced embodied energy	<i>Collaborative Projects (Large-scale projects)</i>	39
EeB.NMP.2011-2	New efficient solutions for energy generation, storage and use related to space heating and domestic hot water in existing buildings		
EeB.NMP.2011-3	Energy saving technologies for buildings envelope retrofitting		
EeB.NMP.2011-4	Geo-clusters approach to support European energy-efficiency goals	<i>Coordination and Support Actions (coordinating)</i>	1 ⁴⁷

⁴³ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication

⁴⁴ The Director-General responsible may delay this deadline by up to two months

⁴⁵ The budget for this call is indicative. The final budget awarded to actions implemented through calls for proposals may vary:

- the final budget of the call may vary by up to 10% of the total value of the indicated budget for the call; and
- any repartition of the call budget may also vary by up to 10% of the total value of the indicated budget for the call.

⁴⁶ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority

⁴⁷ In the case the budget of 1 million for the topic **EeB.NMP.2011-4** cannot be consumed (totally or partially) the remaining budget will allocated to the NMP topics in the area of the Energy Efficient Buildings.

		action)	
Environment (including Climate Change)			
EeB.ENV.2011.3.1.5-1	Technologies for ensuring, monitoring and/or controlling a high quality indoor environment ⁴⁸ particularly in relation to energy efficient buildings	<i>Collaborative Projects (small or medium-scale focused research project)</i> ⁴⁹	5
EeB.ENV.2011.3.1.5-2	Operational guidance for Life Cycle Assessment studies of the Energy Efficient Buildings Initiative	<i>Coordination and Support Actions (supporting action)</i> ⁵⁰	0.5
Energy			
EeB.ENERGY.2011.8.1-1	Demonstration of very low energy new buildings	<i>Collaborative Projects</i> ⁵¹	20
ICT – Information and Communication Technologies			
EeB-ICT-2011.6.4	ICT for energy-efficient buildings and spaces of public use - a) targeted outcome	<i>Collaborative Projects (STREP only)</i>	19
EeB-ICT-2011.6.4	ICT for energy-efficient buildings and spaces of public use - b) targeted outcome	<i>Coordination and Support Actions (CSA)</i>	1

- **Eligibility conditions**

The general eligibility criteria are set out in Annex 2 of this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation

⁴⁸ A high quality indoor environment should be safe, healthy, comfortable, and accessible, should prevent accidents, and provide positive stimulation to users, and facilitate independent living and/or participation in society.

⁴⁹ Maximum requested EU contribution per project: EUR 2 500 00. Up to two projects can be funded

⁵⁰ Maximum requested EU contribution per project: EUR 500 00. Up to one proposal can be funded

⁵¹ Up to 5 projects can be supported

of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country.

For Coordination and Support Actions, the minimum conditions shall be:

- Coordination and Support Actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.
- Coordination and Support Actions – **supporting actions**: at least 1 independent legal entity.

• **Additional eligibility criteria**

For the following topics, implemented via large scale integrating projects: the **EU funding requested must be greater than EUR 4 million**:

- **EeB.NMP.2011-1** Materials for new energy efficient building components with reduced embodied energy;
- **EeB.NMP.2011-2** New efficient solutions for energy generation, storage and use related to space heating and domestic hot water in existing buildings;
- **EeB.NMP.2011-3** Energy saving technologies for buildings envelope retrofitting.

For the following topic, implemented via small or medium-scale focused research projects: **EU funding requested must not exceed EUR 2.5 million**:

- **EeB.ENV.2011.3.1.5-1** Technologies for ensuring, monitoring and/or controlling a high quality indoor environment⁵² particularly in relation to energy efficient buildings.

For the following topic, implemented via coordination and support action (supporting action): **EU funding requested must not exceed EUR 0.5 million**:

- **EeB.ENV.2011.3.1.5-2** Operational guidance for Life Cycle Assessment studies of the Energy Efficient Buildings Initiative.

For the ICT topic **EeB-ICT-2011.6.4**, each proposal must indicate the type of funding scheme used - CA or SA for Coordination and Support Actions. See Appendix 2 to the ICT chapter of the Cooperation work programme for further details.

• **Evaluation procedure**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

Each Theme will be responsible for its own budget and for the implementation of the respective call topics. This includes drawing up ranking lists per Theme and subsequent negotiation and follow-up of the grant agreements resulting from the proposals selected under the respective call topics.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact**. For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5

⁵² A high quality indoor environment should be safe, healthy, comfortable, and accessible, should prevent accidents, and provide positive stimulation to users, and facilitate independent living and/or participation in society.

Impact	3/5
Overall threshold required	10/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

See also Annex 2: Eligibility and evaluation criteria for proposals and priority order for proposals with the same score⁵³.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

• **Indicative evaluation and contractual timetable:**

Evaluation of proposals: January 2011. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of March 2011.

• **Consortium agreements**

Consortium agreements are required for *all* actions.

• **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a ranked list of proposals retained for funding will be drawn up by each Theme as well as a reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

For topic **EeB.ENERGY.2011.8.1-1** the following applies:

- Successful proposals will be asked to follow a common monitoring data structure, using a common methodology, in order to feed the relevant Commission data bases (e.g. CONCERTO data base).
 - The form of grant applied for 'Energy efficiency in Buildings' is based on additional energy efficiency measures in buildings. The grant will be composed of a combination of:
 - the typical reimbursement of eligible costs, and
 - flat rate financing determined on the basis of scale of unit costs for the demonstration part of the project.
 - For the flat rate financing, the unit value of the European Union's financial contribution is fixed to an eligible cost of EUR 100 /m² eligible costs and thus to a European Union contribution of EUR 50 /m².
 - The total of the European Union financial contribution based on flat rate financing may not exceed EUR 6 million.
 - The evaluation of the proposals will also take into account the degree of excellence and innovation of the technology used and the most cost effective practices (euros/efficiency gain; euros/CO₂ reduction, kWh/m²/year saved). For this reason, the above figures should be indicated in the proposal.
- **Use of flat rates for subsistence costs:**

⁵³ For the NMP Programme, and in contrast with Annex 2, at Panel stage, the priority order of the proposals with equal overall scores will be established in accordance with their scores for the S/T Quality criterion. If they are still tied, they will be prioritised according to their scores for the Impact criterion. If proposals are still tied, they will be prioritised on the basis of the work programme coverage.

For topics EeB.NMP.2011-1, EeB.NMP.2011-2, EeB.NMP.2011-3, EeB.NMP.2011-4, EeB.ENV.2011.3.1.5-1, EeB.ENV.2011.3.1.5-2 and EeB.ENERGY.2011.8.1-1 and in accordance with Annex 3 to this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

Public-Private Partnership "Green Cars": Cross-Thematic call jointly implemented between NMP, ENVIRONMENT (including Climate Change), and TRANSPORT (including Aeronautics)

Call title: Sustainable automotive electrochemical storage

- **Call identifier:** FP7-2011-GC-ELECTROCHEMICAL-STORAGE
- **Date of publication:** 20 July 2010⁵⁴
- **Deadline:** 2 December 2010⁵⁵ at 17.00.00 (Brussels local time).
- **Indicative budget** ^{56 57}: EUR 25.5 million from the 2011 budget of which:
 - EUR 10 million from Theme 4 – Nanosciences, nanotechnologies, materials and new production technologies (NMP)
 - EUR 5.5 million from Theme 6 – Environment (including Climate Change)
 - EUR 10 million from Theme 7 – Transport (including Aeronautics).

The budget for this call is indicative. The final budget of the call may vary by up to 10% of the total value of the indicated budget for the call.

In case the budget can not be consumed (totally or partially), the remaining budget will be returned to each FP7 theme according to its respective contribution.

- **Topics called:**

The topic on **Advanced eco-design and manufacturing processes for batteries and electrical components** is identical in each theme. Hence, each proposal must be submitted only **once** either to topic GC.NMP.2011-1 or to topic GC.ENV.2011-3.1.3-1 or topic GC.SST.2011-7.7, **but not to all**.

Activity/ Area	Topics called	Funding Schemes	Budget Million EUR
GC.NMP.2011-1	Advanced eco-design and manufacturing processes for batteries and electrical components	<i>Collaborative projects (Large-scale projects)</i>	25.5
GC.ENV.2011-3.1.3-1			
GC.SST.2011-7.7			
GC.ENV.2011-3.1.3-2 ⁵⁸	Operational guidance for Life Cycle Assessment studies of the European Green Cars Initiative	<i>Coordination and support action (Supporting action)</i>	

- **Eligibility conditions:**

⁵⁴ The Director-General responsible for the call may publish it up to one month prior to or after the envisaged date of publication.

⁵⁵ The Director-General responsible may delay this deadline by up to two months.

⁵⁶ A single reserve list will be constituted if there are a sufficient number of good quality proposals. It will be used if extra budget becomes available.

⁵⁷ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority.

⁵⁸ Up to one project can be funded

The general eligibility criteria are set out in Annex 2 to this work programme, and in the guide for applicants. Please note that the completeness criterion also includes that part B of the proposal shall be readable, accessible and printable.

Only information provided in part A of the proposal will be used to determine whether the proposal is eligible with respect to budget thresholds and/or minimum number of eligible participants.

The minimum number of participating entities required, for all funding schemes, is set out in the Rules for Participation: For Collaborative projects, the minimum condition shall be the participation of 3 independent legal entities, each of which is established in a Member State or Associated Country and no two of which are established in the same Member State or Associated Country

For Coordination and Support Actions, the minimum conditions shall be:

- Coordination and Support Actions – **coordinating actions**: at least 3 independent legal entities, each of which is established in a Member State or Associated Country, and no 2 of which are established in the same Member State or Associated Country.

- Coordination and Support Actions – **supporting actions**: at least 1 independent legal entity.

- **Additional eligibility criterion:**

For the topic **Advanced eco-design and manufacturing processes for batteries and electrical components**, implemented via large scale collaborative projects: **the EU funding requested must be greater than EUR 4 million.**

For the topic: **Operational guidance for Life Cycle Assessment studies of the European Green Cars Initiative**, implemented via coordination and support action (supporting action): **the EU funding requested must not exceed EUR 500 000.**

- **Evaluation procedure:**

A one-stage submission procedure will be followed.

Proposals will be evaluated in a single-step procedure. Proposals could be evaluated remotely with the consensus sessions being held in Brussels.

For this call the following criteria and thresholds are applied: **1. S/T quality; 2. Implementation; 3. Impact.** For each criterion marks from 0 to 5 will be given, with the possibility of half-point scores. Successful proposals must pass the minimum thresholds as follows:

	Minimum threshold
S/T quality	3/5
Implementation	3/5
Impact	3/5
Overall threshold required	10/15

Further information on elements to be taken into account in the evaluation is given under the respective topic descriptions.

Applicants must ensure that proposals conform to the page limits and layout given in the Guide for Applicants, and in the proposal part B template available through the EPSS.

- **Indicative evaluation and contractual timetable:**

Evaluation of proposals: January 2011. It is expected that the grant agreement negotiations for the shortlisted proposals will start as of March 2011.

- **Consortium agreements**

Consortium agreements are required for Collaborative projects.

- **Particular requirements for participation, evaluation and implementation:**

As a result of the evaluation, a single ranked list of proposals retained for funding will be drawn up as well as a single reserve list of proposals that may be funded in case budget becomes available during negotiations.

The forms of grants and maximum reimbursement rates which will be offered are specified in Annex 3 to the Cooperation work programme.

- **Use of flat rates for subsistence costs:**

In accordance with Annex 3 of this work programme, this call provides for the possibility to use flat rates to cover subsistence costs incurred by beneficiaries during travel carried out within grants for indirect actions. For further information, see the relevant Guides for Applicants for this call. The applicable flat rates are available at the following website: http://cordis.europa.eu/fp7/find-doc_en.html under 'Guidance documents/Flat rates for daily allowances'.

III.3 ERANET and ERANET Plus topics

The topics to be implemented via **ERANET** under Theme 4 – NMP - Nanosciences, Nanotechnologies, Materials and new Production Technologies is included in the single ERANET coordinated call and are described in Annex 4. These topics are shown below:

Activity/ Area	Topics called	Budget Million EUR
ERA-NET	NMP.2011.2.3-2 ERA-NET on research on materials science and engineering, including international cooperation	3
	NMP.2011.4.0-6 ERA-NET on the industrial handling of raw materials for European industries	1.5
	NMP.2011.4.0-7 ERA-NET on industrial safety	1.5

Additional eligibility criteria: Only ERA-NET eligible partners can participate. The minimum number of participants is set at three independent legal entities managing publicly funded national or regional programmes, each of which is established in a Member State or Associated Country.

IV OTHER ACTIONS AND PUBLIC PROCUREMENT IN 2010

IV.1 OTHER ACTIONS⁵⁹

The funding of projects through the above schemes and the development of the programme will be supported by:

- the use of appointed **independent experts** for the evaluation of project proposals, as independent observers at these evaluations where appropriate, for the reviewing of running projects, and for focus groups (evaluation);

Funding scheme: Coordination and Support Action (supporting actions) - appointment letter

Indicative Budget: EUR 1 921 000

- **Support for the work of experts groups:** in charge of driven synthesis of RTD needs in the NMP areas and advising on the Directorate's policy making and WP preparation.

Funding scheme: Coordination and Support Action (supporting actions) - appointment letter

Indicative Budget: EUR 30 000

⁵⁹ In accordance with Articles 14, 17 and 27 of the Regulation No 1906/2006 of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013).

IV.2 PUBLIC PROCUREMENT IN 2011

(1) New calls for tenders leading to framework contracts not using budget in 2011

a) Project Technical Assistants (PTA) for NMP - Third call

- Subject: External assistance to enable detailed, prompt, pro-active, and scientifically competent follow-up by the Commission of NMP projects.
- Contracts: Three framework contracts with a duration of 4 years, each covering the topics managed by one of the operational units of directorate RTD.G (specific contracts will be concluded only in 2012 and 2013 and the total expenditure will not exceed EUR 3 M)
- Indicative budget: to be allocated in the work programmes of 2012 and 2013
- Timing: Fourth quarter of 2010

b) Exploitation Strategy and Innovation Consultants (ESIC) - Second call

- Subject: External assistance to identify and address possible or actual obstacles to the future or imminent exploitation of the intended or already achieved results of projects (this includes the Exploitation Strategy Seminars).
- Contracts: One framework contract with a duration of 2 years (renewable for 2 more years in case of continuation of the NMP activity after 2013; total expenditure will not exceed EUR 2 M)
- Indicative budget: to be allocated in the work programmes of 2012 and 2013
- Timing: Fourth quarter of 2010

(2) Specific contracts to be concluded in 2011 under existing framework contracts

a) Project Technical Assistants (PTA)

- Subject: External assistance to enable detailed, prompt, pro-active, and scientifically competent follow-up by the Commission of NMP projects.
- Contracts: Up to 20 specific contracts for a duration corresponding to the duration of the projects covered.
- Indicative budget: maximum EUR 1 500 000 in 2011.

b) Exploitation Strategy and Innovation Consultants (ESIC)

- Subject: External assistance to identify and address possible or actual obstacles to the future or imminent exploitation of the intended or already achieved results of projects (this includes the Exploitation Strategy Seminars).
- Contracts: 6 specific contracts (one every 2 months) with a duration of max. 6 months, possibly complemented by order forms.
- Indicative budget: maximum EUR 450 000 in 2011.

(3) New procurement procedures leading to direct contracts

a) Technology and market perspective for future value-added materials

Subject: Providing a detailed materials market overview (by segment) and to point out various technical and economic scenarios linked with the potential future development and use of novel materials and the principle of sustainable development

Contracts: 1 contract of 4 months

Timing: Upon approval of this work programme (third quarter of 2010)

Indicative budget: EUR 60 000

b) Monitoring of policy, industry and society aspects of nanotechnology

Subject: Follow-up of indicators and providing data for the implementation reports of the new Nanotechnology Action Plan

Contracts: 1 contract of 18 months

Timing: Fourth quarter of 2010

Indicative budget: EUR 60 000

c) Enabling technologies and open innovation: Analysis of best conditions for transfer of knowledge

Subject: Analysis of innovation mechanisms for specific industrial sectors, with particular emphasis on SMEs. Studies should be based on sound field work, taking due account of the contributions of research projects, including but not limited to those funded by successive Framework Programmes. The study should analyse how and to what extent R&D projects have led to innovative products and services, as well as their socio-economic context, compare results and approaches dealing with that issue and make recommendations for improving the dissemination and use of knowledge gained from FP projects transfer in synergy with stakeholders at national and regional levels.

Contracts: up to 3 contracts of 18 months

Timing: First half of 2011

Indicative budget: EUR 900 000

d) Strategy definition and road mapping for industrial technologies to address grand challenges

Subject: Assess the links and relevance of present NMP activities and topics to the major technical issues and bottlenecks associated with grand challenges. Provide recommendations for priority setting, target definition, measurable pathways and monitoring of future activities in Europe geared to such challenges; and analyse the impact in the field of industrial technologies. This activity should help to identify and justify future actions and priorities in research, demonstration and innovation in the field of industrial technologies.

Contracts: 1 contract of 10 months
Timing: First half of 2011
Indicative budget: EUR 280 000

e) Impacts of ageing working population on adaptation of business models and of technical environment of production lines and supply chains

Subject: Assess the links and relevance of present NMP activities and topics to the major technical issues and bottlenecks associated with grand challenges. Provide recommendations for priority setting, target definition, measurable pathways and monitoring of future activities in Europe geared to such challenges; and analyse the impact in the field of industrial technologies. This activity should help to identify and justify future actions and priorities in research, demonstration and innovation in the field of industrial technologies.

Contract: 1 contract of 12 months
Indicative budget: EUR 200 000
Timing: Second half of 2011

V. INDICATIVE BUDGET

V.1 NMP Theme - INDICATIVE BUDGET⁶⁰ (Million EUR): Five calls 2011

		2011⁶¹
5th calls	Call FP7-NMP-2011-LARGE-5	118
	Call FP7-NMP-2011-SMALL-5	99.50
	Call FP7-NMP-2011-SME-5	40
	Call FP7-NMP-2011-CSA-5	12
	Call FP7-NMP-ENERGY-2011 (call jointly implemented with Energy)	15
	Call FP7-NMP-ENV-2011 (call jointly implemented with Environment)	6
	Call FP7-NMP-2011-EU-Russia (Coordinated call EU-Russia)	4.50
	Call FP7-NMP-2011-EU-Japan (Coordinated call EU-Japan)	5
	Call ERANET ⁶²	6
	Sub-total (NMP topics)	306.00
	Public-Private Partnerships (PPPs) calls	Factories of the Future
Energy-efficient Buildings		40
Green cars		10
	Sub-total (PPPs' topics)	130
Total estimated budget		436.00
General activities (cf Annex 4 – details below)		5.28
Other activities	- <i>Evaluation and reviewer</i> (1.92) - <i>PTA (Project Technical Advisers)</i> (1.50) - <i>Procurements (ESIC, studies – 1.95)</i> - <i>Other actions (EAG; roadmap – 0.03)</i>	5.40
Estimated total budget		446.68

		2011⁵⁰
General Activities (see Annex 4)	- <i>Cordis</i> (0.814) ⁶³ - <i>Eureka/Research organisations</i> (0.036) - <i>COST</i> (4.322)	

⁶⁰ The Budget figures given in this table are rounded to two decimals points

⁶¹ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority.

⁶² Call fiche: see Annex 4 to the Cooperation work programme

⁵⁰ Under the condition that the draft budget for 2011 is adopted without modification by the budgetary authority.

	<ul style="list-style-type: none"> - <i>Strategic activities (0.062)</i> - <i>Performing org. (0.031)</i> - <i>Experts (0.010)</i> 	5.28
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* Under the condition that the draft budget for 2011 is adopted without modifications by the budgetary authority.

All budgetary figures given in this work programme are indicative. The final budgets awarded to actions implemented through calls for proposals may vary by up to 10% of the total value of the indicated budget for each call.

For actions not implemented through calls for proposals:

- The final budgets for evaluation, monitoring and review may vary by up to 20% of the indicated budgets for these actions;
- The final budget awarded for all other actions not implemented through calls for proposals may vary by up to 10% of the indicated budget for these actions.

⁶³ This amount is reserved to support the CORDIS activities in 2011. The exact content of the CORDIS activities in 2011 will be specified through an update of Annex 4 to the Cooperation work programme at a later stage.

VI. INDICATIVE PRIORITIES FOR FUTURE CALLS

Broadly speaking, future calls of the NMP Theme will continue to span the spectrum from enabling research to applications and demonstration activities. There will be an increasing emphasis on industrial applications, although longer-term, enabling research is also seen as a source of innovation. Application-oriented topics will continue to be implemented mainly through large integrating projects. Since the beginning of FP7, such projects have absorbed more than half of the total NMP budget. **Demonstration activities**, already addressed in PPP topics, are expected to receive more attention, possibly going beyond pilot implementations in industrial settings. For nanotechnologies, in particular, demonstration activities will continue to explore ways of evolving from a laboratory environment into industrial scale production. Similarly, further efforts will be made to enhance industrial participation further, with a view to introducing more innovation-related elements. By using SME-targeted collaborative projects and appropriate topics, the NMP theme will continue to provide strong support to **SME participation**, which is currently around 23% in budgetary terms in projects funded under the NMP theme. The topics in question will continue to be defined with the aim of reinforcing the S&T base of SMEs and validating innovative solutions. **International collaboration** will continue to be supported, in pursuing fundamental, global objectives, for instance understanding fundamental properties, access to infrastructures, metrology and standardisation, and validating environmentally friendly materials.

The NMP Theme will provide strong support to the **Europe 2020 strategy**, which calls for smart, sustainable and inclusive growth. The NMP Theme plays a crucial role in supporting **smart growth** and supporting the recovery of EU industry: it will continue to implement the recovery package through PPPs, and to respond to needs identified by industry-oriented ETPs. With regard to **sustainability and societal benefits**, the emphasis will continue to be on resource and energy efficiency, protection of the environment and improvements in health care.

The following areas are expected to be targeted. This list is indicative, not binding and not necessarily exhaustive. The PPP topics in particular will follow the strategic roadmaps identified by the industrial advisory groups.

In support of the Factory of the Future: high-performance manufacturing, human-robot interaction, adaptive manufacturing machines for optimal energy use.

In the area of energy efficient buildings: components, retrofitting (e.g. lighting and HVAC), business models, eco-friendly building materials, district heating.

To address needs in energy: nanotechnologies for efficient energy storage and energy efficiency; materials for extreme conditions, batteries and photovoltaics.

To address environment issues and sustainable development: nanotechnologies for improving air quality, soil and groundwater remediation; recyclability and conversion; nanocatalysts; low-cost materials; low-emission processing and manufacturing; eco-friendly consumer goods; resource management for process industries; use of renewable resources and environmentally friendly materials in manufacturing.

To address needs in health and safety: nanomedicine applications including in vivo imaging, in vitro diagnosis and translatable nanomedicines; biomaterials for regenerative medicine; implantable devices. Strong support for research into health and environmental safety aspects of nanotechnology, and for industrial safety.