HORIZON 2020

WORK PROGRAMME 2014 – 2015

5. Leadership in enabling and industrial technologies

ii. Nanotechnologies, Advanced Materials, Biotechnology and Advanced Manufacturing and Processing

Important Notice on the First Horizon 2020 Work Programme

This Work Programme covers 2014 and 2015. Due to the launching phase of Horizon 2020, parts of the Work Programme that relate to 2015 (topics, dates, budget) are provided at this stage on an indicative basis only. Such Work Programme parts will be decided during 2014.

(European Commission Decision C (2013)8631 of 10 December 2013)

Table of contents

Pilot on Open Research Data

A novelty in Horizon 2020 is the Open Research Data Pilot which aims to improve and maximise access to and re-use of research data generated by projects. While certain Work Programme parts and areas have been explicitly identified as participating in the Pilot on Open Research Data, individual actions funded under the other Horizon 2020 parts and areas can choose to participate in the Pilot on a voluntary basis. The use of a Data Management Plan is required for projects participating in the Open Research Data Pilot. Further guidance on the Open Research Data Pilot is made available on the Participant Portal.

Call for Nanotechnologies, Advanced Materials and Production

H2020-NMP 2014/2015

This call includes topics on nanotechnologies, advanced materials, production and support actions for the deployment of KETs. It includes contributions to cross-cutting KETs, and addresses both KETs for multiple applications, and KETs for applications in specific societal challenges or focus areas; as well as safety, outreach, structuring, business models and other innovation issues.

Bridging the gap between nanotechnology research and markets

This challenge addresses three of the key European nano-enabled industrial value chains: lightweight multifunctional materials and sustainable composites; structured surfaces; and functional fluids. The potential of multifunctional nanomaterials and composites has been demonstrated in RTD actions for several application sectors, such as packaging, transport and construction. However, a number of barriers need to be addressed, in order to leverage large scale market introduction of such innovative, safe and sustainable products. Activities addressing this challenge will therefore implement the next steps towards the deployment and market introduction of lightweight, multifunctional, economical and environmentally friendly nano-enabled products for different applications, by scaling up laboratory experience to industrial scale and by demonstrating the viability of a variety of manufacturing technologies.

The main challenge is to develop seamless integration of technologies and processing for using nanomaterials in production; to improve the control and monitoring of the conditions required for the use of nanomaterials in industrial processes, including (in-situ) metrology; to increase the level of robustness and repeatability of such industrial processes; to optimise (using modelling and simulation where appropriate) and evaluate the increased performance and functionality of the product and of the production line, in terms of productivity in an actual operational environment). SMEs are particularly affected and are invited to participate, in order to develop and make use of the needed economic and knowledge and infrastructure capacity to carry out the required developments of process control, metrology and lifecycle analysis in-house, which represent critical steps before committing to pilot production.

Proposals are invited against the following topics:

NMP 1 – 2014: Open access pilot lines for cost-effective nanocomposites

Specific challenge: The field of nanocomposites materials has witnessed remarkable progress in recent years with many different types of nanocomposites exhibiting radically enhanced properties for a wide range of industrial applications. New manufacturing routes are also emerging, such as in-situ synthesis. The main objective is to develop cost effective and

sustainable industrial scale technologies for the production of nanocomposites for specific applications, aiming at the selection, testing and optimisation of materials and process parameters as well as the verification of the nanocomposite performance for a given application in a pilot line setting, representative of operational industrial environments and ready for the start of pilot production as the next step (after the project).

In order to enable SMEs to enter this crucial stage of the research-development-innovation cycle, larger enterprises and/or research and technological organisations are asked to get together in order to provide a coordinated network of pilot line, test and validation services for SMEs in order to prepare for management decisions to progress to the next step of new technology deployment, i.e. installation of industrial pilot lines and enter the commercialisation stage.

Scope: The development of pilot lines: Pilot line development is expected to use an existing pilot line as a basis and may include new methods and/or instrumentation with real time characterization (including high-throughput) for measurement, analysis and operations at the nanoscale to characterise relevant materials properties, e.g. nanofillers dispersion, with improved resolution and/or increased sensitivity, based on novel approaches or novel combinations of approaches.

The operation of the pilot lines – testing and validation include: selection and tailoring of nano-particles/objects having the required interfacial interaction and/or compatibility with the matrix to be utilised in the nanocomposite; selection of a processing technique and optimization of process parameters addressing proper dispersion and distribution of nano-particles or nano-particle aggregates within the matrix; development of quality control and process verification.

Proposals should address a range of industrial applications and involve a number of composite producers, addressing in particular the needs of SMEs active in this sector. Plans for operating the network of pilot lines as well as the individual pilot line facilities after the end of EU financial support should be prepared within the proposal, including business plans for the cooperation with SMEs.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 4-5, target TRL 6. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- A European eco-system for high TRL testing and validation of nano-composites, affordable and accessible for SMEs, through technical collaboration between RTOs and composite producers and through identification of all critical value chain players for the market introduction of the final product.

- Enabling of investment decisions for market introduction of novel, cost-effective, safe and sustainable nano-enabled products that demonstrate superior performance in terms of multifunctionality and sustainability, e.g. in the packaging, textiles, transport, energy, electronics and construction sectors. This non-exhaustive list does not preclude submission and selection of proposals addressing other sectors.
- Demonstrated scaling-up and increased degree of automation of nanocomposites production lines/processes, leading to higher production volumes, improved reliability and repeatability of produced nanocomposites and lower production cost; availability of new or significantly improved "fit for purpose" tools for integration in those lines;
- Contribution to standardisation in the nano metrology field for fast product and process design.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[1].

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 2 – 2015: Integration of novel nanomaterials into existing production lines

Specific challenge: Nanomaterials are intended to improve the performance of existing production technologies, and to give new functionalities to products, such as lightweight solutions for transportation and construction, enhanced properties for packaging materials and processes, decreased wear and friction of yarns, enhanced electrical performance and reliability and high-performance thermal insulation and UV shielding fibrous materials (e.g. hollow fibres). However, such new nanomaterials need to be introduced into production and the correct controlled conditions need to be created and maintained in industrial processes.

Scope: Development and demonstration in operational environments; the integration of technologies and processing for using novel nanomaterials in production; to improve the control and monitoring of the conditions required for the use of nanomaterials in industrial processes; to increase the level of robustness and repeatability of such industrial processes; to optimize and evaluate the increased performances of the production lines in terms of productivity and cost-effectiveness; to assess the functionality and performance of the produced component/product.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 5-6, target TRL 7, Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

[1] EU Nano-safety strategy 2015-2020 and NanoReg project

Expected impact:

- Accelerated market uptake of nanomaterials and products in one or more of the following sectors: fibre, yarn and textile; biomedical products, packaging products; energy; construction and building; and transportation. This non-exhaustive list does not preclude submission and selection of proposals addressing other sectors.
- Improvement in existing manufacturing processes and equipment through integration of nano materials, demonstrating better resource efficiency, safety, sustainability and recyclability of a wide variety of components and final products.
- Improvement in technical knowledge on the integrated manufacturing processes for nanomaterials in terms of productivity and cost-effectiveness.
- Contribution to development of business plans that encourage private sector investment for future business growth.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[2].

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 3 – 2015: Manufacturing and control of nanoporous materials

Specific challenge: There is a constantly growing interest in nanostructured porous materials, thanks to the many applications that can benefit from controlled porosity at the nanoscale. Nanoporous materials can have many kinds of pore geometries, structures and chemical compositions and possess unique surface, structural, and bulk properties that underline their important uses in various fields. While various methods are available for creating nanoporous materials in a laboratory environment, scaling-up and meeting the industrial demands in terms of quality and costs remain a challenge.

Scope: Proposals should address the development and demonstration in relevant industrial environments of reliable processes control and manufacturing routes, to obtain nanoporous materials with controlled porosity distribution or gradient aiming at improved mechanical properties, reliable permeation rate, different electrical properties, anti-fouling or other bio-, photo- or thermo-chemical/physical properties.

Proposals should demonstrate the effectiveness of the developed approaches and technologies, through a pilot line aimed at the production of semi-finished products. The process and the material proposed should support and reflect developing guidance and standards relating to nanomaterials aspects.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 4-5, target TRL 6. Implemented as cross-KET activities.

[2] EU Nano-safety strategy 2015-2020 and NanoReg project

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Supporting European competitiveness through accelerated market uptake of nanoporous materials in one or more of the following application fields: transport; energy; construction and building; biomedical; catalysis; sensors; filtration, purification and chromatography; This non-exhaustive list does not preclude submission and selection of proposals addressing other application fields;
- Improvement in cost-effectiveness and sustainability of nanoporous materials with a verified market viability of the pilot line;
- New market opportunities through introduction of novel products enabled by nanoporous materials;
- Demonstrated scaling-up of production of nanoporous materials, leading to higher production volumes, improved reliability and repeatability of products with lower production cost;
- Improvement in technical knowledge concerning manufacturing processes of nano porous structuring of materials with innovative methods and solutions.
- Contribution to on-going and future standardisation work in the field[3]
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[4].

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 4 – 2014: High definition printing of multifunctional materials

Specific challenge: A range of industrial processes (e.g. roll to roll, sheet to sheet) exist for high volume manufacturing involving flexible substrates. The use of these processes has widened from paper and textiles to advanced multi-layer coatings and/or stacks, and to new industries with applications e.g. in electrical circuits, electronic components and bio-functional constructs, comprising integrated combinations of several printed multifunctional materials. Currently there is significant interest on the part of manufacturers in adapting these high throughput technologies for the miniaturisation of feature sizes to the nanoscale, which would provide a new and disruptive manufacturing technology. There is a need to develop high speed, high resolution print technologies, integrating several materials aiming at material properties comparable or better than what is achievable with traditional manufacturing techniques.

Scope: Proposals should address industrial needs by developing and demonstrating in relevant industrial environments high throughput printing technologies (possibly in combination with other deposition technologies) with higher definitions (down to nanoscale) utilising a wider spectrum of multifunctional materials. Technical challenges relate to developing suitable

[3] See Mandate M/461 addressed by the European Commission to CEN/CENELEC and ETSI. http://www.cen.eu/cen/Sectors/Sectors/Nanotechnologies/Documents/M461.pdf

[4] EU Nano-safety strategy 2015-2020 and NanoReg project

printing technologies for high resolution and a wide range of materials; achieving high overlay registration accuracy, especially for multi-material applications; and obtaining the right functionality after drying/sintering.

Pilot line setting should be used to verify production speed and reliability, as well as sufficient yield, quality and functionality of the intended application.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 4-5, target TRL 6. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Significant improvements in industrial productivity and cost competitiveness in comparison with traditional processes, such as lithography, verified in a pilot line setting in terms of production speed and reliability, as well as sufficient yield, quality and functionality of the intended application;
- Contribution to improved resource efficiency, safety and environmental friendliness of high throughput printing processes and related products (e.g. aiming at fully degradable products);
- Contribution to improved technical knowledge on printing of functional materials at the nanoscale, leading to new products and creating market opportunities for European industries;
- Identification of gaps in standards, paving the way for future pre-normative activities in the field.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[5].

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 5 – 2014: Industrial-scale production of nanomaterials for printing applications

Specific challenge: The migration towards low-cost, liquid-based, high-resolution deposition and patterning processes such as ink jet, soft lithography, scanning probe-based lithography (e.g. dip-pen), spin-on and screen printing compatible with flexible substrates and high throughput printing systems (e.g. roll to roll and sheet to sheet) requires that suitable

[5] EU Nano-safety strategy 2015-2020 and NanoReg project

functional nanomaterials formulations (inks) are available for end users in industrially relevant quantities.

Scope: Proposals should aim at developing and demonstrating in relevant industrial environments the synthesis and functionalisation of nano-materials for printing applications with high process throughput. Technical challenges relate to the optimisation of the synthesis process for controlling the crystallinity and morphology of functional materials, as well as obtaining the rheological properties needed for wet deposition technologies. Post and in-process characterisation methods should be addressed to ensure a stable, sustainable production process. The developed nanomaterials (inks) formulations should demonstrate functionality, process compatibility, non-toxicity, environmental friendliness (e.g. aqueous media) and low-cost.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 4-5, target TRL 6. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Supply of low cost, high performance and environmentally friendly functional nanomaterials (inks) tailored for high throughput printing systems, allowing European manufacturers to exploit the great growth opportunity in this field;
- Creation of new market opportunities for nanomaterials suppliers, SMEs in particular;
- Promote closer collaboration between materials suppliers, production engineers, equipment manufacturers and end-users, addressing the full value chain and leading to a competitive advantage in the market introduction of the final products;
- Contribution to standardisation in relation to nanomaterial interaction with the printing process for better product and process design.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[6].

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 6 – 2015: Novel nanomatrices and nanocapsules

Specific challenge: Encapsulation technologies have been widely used for a long time in the pharmaceutical industry for drug delivery applications. The emergence of nanotechnology and

[6] EU Nano-safety strategy 2015-2020 and NanoReg project

the availability of novel tools have paved the way for a new type of nanomatrices and nanocapsules, which can be used for targeted delivery and can carry payloads for localised action in many application fields.

Scope: Proposals should address applications for safe, controlled and reliable novel nanomatrices and nanocapsules containing active ingredients (e.g. drugs in nanomedicine, vitamins or anti-oxidants for cosmetic and personal care products, or cleaning and antimicrobial agents for housecleaning products), as well as their manufacturing processes. Different types of nanomatrices and nanocapsules are required, depending on the nature of the material (hydrophobic or hydrophilic) to be incorporated. Technical challenges relate to the production techniques involved (such as coacervation or phase separation) for improving the stability of the nano formulation and the active ingredients (payload) involved; development of novel mechanisms for the release of the payload (e.g. in response to changes in temperature or pH) is a further challenge. Nanomatrices or nanocapsules as carriers for targeted delivery could also be addressed. Safety considerations and contribution to standardization should be an integral part of the projects.

Activities expected to focus on Technology Readiness Level 4-5. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Supply of safe, energy- and resource-efficient manufacturing systems for nanomatrices and nanocapsules, with the potential for radical improvements in therapy and/or quality of life;
- Benefit the European healthcare and/or consumer sectors through novel new systems and improved collaborations between the key actors in the value chain;
- Paving the way for the future commercialisation of such products, based on an analysis of the efficacy, safety and cost-benefit of products utilising nanomatrices/nanocapsules for the end-users or patients.
- Identification of gaps in standards, paving the way for future pre-normative activities in the field.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[7].

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 7 – 2015: Additive manufacturing for table-top nanofactories

Specific challenge: Additive manufacturing (AM) delivers a new manufacturing paradigm: it makes the rapid, distributive manufacture of complex objects possible, and has the potential to reduce waste. What is truly transformative about additive manufacturing is the potential to manufacture individual products anywhere in the world, and to customise each of them.

[7] EU Nano-safety strategy 2015-2020 and NanoReg project

Rather than make manufactured goods in one place and ship them around the world, additive manufacturing technologies, such as 3D printing makes it possible to send design blueprints instantaneously via the internet, and manufacture them when and where they are needed.
3D printers are growing in sophistication, and can create increasingly complex objects, including those with different component parts. Breakthroughs in techniques such as metal sintering and processing of ceramic materials mean that 3D printers are no longer restricted to generic plastics. The use of nanoparticles in 3D printing is progressing rapidly, and could vastly increase the range of products that can be manufactured in this way.

Scope: As a part of a wider initiative towards nano-manufacturing, the objective of this topic is to advance the state-of-the art of AM materials through modification of their fundamental material properties using nanotechnology and to develop novel additive manufacturing techniques that incorporate new functionalities and/or significant performance increase, e.g. by utilising printable high-strength materials in the manufactured components. For example, carbon nanotube or other functional nano-structures could be embedded and combined with the printing process to perform electronic functions such as sensing and communications, or bio materials, such as flexible polymers or ceramics could be used to create bio-inspired structures.

Activities expected to focus on Technology Readiness Level 4-5. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Enabling Europe to compete at the forefront of the additive manufacturing revolution, which in the long term will lead into entire new production and consumption paradigms;
- Enabling manufacturing activities by SMEs to enter markets with innovations that were not possible before;
- Widening the range of available AM materials and functionalities in products will accelerate the transition of AM from mere prototyping towards production and use;
- Enabling functionality embedded in AM parts displaces the need for multiple manufacturing operations, making AM processes even more cost effective, including for small series production;
- Enabling the identification of future development needs in related fields, e.g. in seamless design-to-manufacturing software and standardization for material and process quality.
- Promoting safe-by-design approaches in collaboration with the EU nano-safety cluster and contributing towards the framework of EU nanosafety and regulatory strategies[8].

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[8] EU Nano-safety strategy 2015-2020 and NanoReg project

Nanotechnology and Advanced Materials for more effective Healthcare

This challenge taps into the potential of nanotechnologies and advanced materials to enable more effective therapies and diagnostics for important diseases. Despite this potential, the translation process from the pre-clinical laboratory-scale proof-of-concept to the actual clinical application is a major innovation challenge that can easily be underestimated. Following a successful proof-of-concept at the pre-clinical laboratory scale, the production technologies of the nanomedicines and nanomaterials have to be scaled-up to the pilot-scale, to provide production quantities that are sufficient for clinical testing. A preliminary design of the clinical tests has to be prepared early-on. The manufacturing of the nanomedicines and nanomaterials has to take place under Good Manufacturing Practice (GMP) conditions. Robust manufacturing and quality control processes therefore need to be developed, according to the medical regulatory requirements. At the same time a complete and efficient industrial supply chain needs to be established to provide the necessary products and services to support all this development. This innovation requires a highly interdisciplinary approach with many interactions between nanotechnologists, materials scientists, biomedical researchers, clinicians, industrialists and regulatory specialists. The aim here is to develop the technologies and therapies to the point where they can be considered fit for purpose to start clinical trials, Clinical trials are not included in the projects, except for allowing Phase I clinical trials if this is specifically mentioned in the topic description.

The assessment of the expected impact should take into account the medical/therapeutical dimension of the proposed solutions, as well as the impact on the supply industry and the process of organising, executing and assessing clinical tests. This includes aspects of responsibilities, access to information, technology transfer for companies, with particular regard to SMEs, and new forms of cooperation between academia, research centres and industrial actors, public and private. Sustainability principles and values and the objectives of the EU 2020 Strategy need to be addressed, together with competitiveness aspects in terms of reducing time-to-market and trial costs for the different actors involved. Dissemination of results should contribute to increasing the awareness in medical communities as well as in the public about more efficient and less costly therapies – based upon innovative approaches and broader accessibility of effective therapies – supporting improved patient compliance. As relevant, further aspects of interest from a social sciences and humanities perspective could be addressed e.g. in support of dissemination and exploitation as well as in the validation of the achieved results.

Gender issues and other aspects such as age, weight or physical constitution should be taken into account in the description of activities, to ensure the research as well as the technologies and innovations to be developed would be suited to both women and men, and the diversity of patients.

Proposals are invited against the following topics:

NMP 8 – 2014: Scale-up of nanopharmaceuticals production

Specific challenge: In nanomedicine the scale-up of nanopharmaceuticals production from pre-clinical laboratory scale to the quantity and GMP quality needed for clinical testing is severely hindered by a lack of pilot manufacturing capacity and supply infrastructure. The quantities required for clinical testing studies are modest (e.g. in the order of ten to hundred grams), but such pilot processes do not fit easily into existing manufacturing plants. The lack of a pilot manufacturing supply chain is especially problematic for SMEs and other organisations that do not have the necessary resources to develop the processes in-house.

Scope: Projects shall develop one or more pilot lines and processes for the scaling-up of the production of innovative nanopharmaceuticals to the quantities needed for clinical testing, taking into account the medical regulatory requirements. The pilot lines shall be developed with the appropriate characterisation and quality control processes. Relevant medical regulatory requirements must be taken into account. Projects shall address industrial sustainablity from an economic, environmental and social point of view. The nanopharmaceuticals selected for scaling-up shall be translatable and in an advanced stage of pre-clinical development, with positives perspectives to proceed to clinical testing. Clinical testing itself is not part of the project. Scaling-up of nanopharmaceuticals production intended primarily for the therapy of cancer is excluded from the scope of this topic as it is addressed in topic NMP 11.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The implementation of this proposal is intended to start at TRL 4-5 and target TRL 6-7. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Improve GMP nanopharmaceuticals supply for enabling clinical trials, further validating and demonstrating the effectiveness of nanopharmaceuticals for medical therapies;
- Leveraging of existing investments in successful pre-clinical nanomedicine research;
- Increase of the attractiveness of Europe as a location-of-choice to carry out advanced medical research and product development, due to improved nanopharmaceuticals supply capacity.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 9 – 2014: Networking of SMEs in the nano-biomedical sector

Specific challenge: Many innovative nano-biomedical developments are initiated by small companies. However, they often miss the necessary knowledge of the regulatory requirements for translation of their ideas, of the market and of the financial aspects of funding the developments and the business. The development and supply chain also show shortcomings. SMEs are often fragmented, dispersed and rarely organised in representative associations to address these problems with the result of missed opportunities for innovation. This is especially true in nanomedicine, covering diagnostics, therapeutics and regenerative medicine.

Scope: In order to alleviate this problem, the ETP Nanomedicine developed the concept of a 'Translation Hub'. This Coordination and Support Action shall provide advice and follow-up at all stages of the research and development and provide examples of best practice to European R&D teams in nano-bio-medicine. It shall provide SMEs and other organisations with a technological and business oriented assessment of their technologies and provide business advice before engaging further resources and efforts for preclinical and clinical tests.

The Coordination and Support Action shall network SMEs, aiming to improve their knowledge of translation in a sustainable way; to build bridges with academia and hospitals; and to link them with large companies and investors. It shall provide education and training in translation and entrepreneurship to academia and SMEs and help the showcasing of preclinical or early clinical proofs of concepts to large companies and investors. It will assist nanomedicine research projects in better anticipating the requirements of the translation process, in order to improve the probability of the developments to reach the market. It will also seek synergies with other relevant SME support networks.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- Reinforce support to European SMEs and academia as drivers of innovations in nanomedicine, by assisting them in the development of their bottom-up ideas, going from pre-clinical proof of concept to late clinical trials.
- Improve the innovation capacity of the European nano-bio-medical sector – especially at the level of SMEs - through catalysing a more effective translation process from research into industrial marketable products.
- Improve the knowledge in the research community of the translation, regulatory and business aspects of new nano-biomedical developments, leading to more efficient use of resources and research.
- Improve the capacities of SME networks regarding technologies and facilities that are required to facilitate the transfer of scientific knowledge to market or to facilitate clinical studies.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 10 – 2014: Biomaterials for the treatment of diabetes mellitus

Specific challenge: Diabetes mellitus and its associated pathologies have become a major public health problem. They cause significant physical and psychological morbidity, disability and premature mortality among those affected and imposes a heavy financial burden on health services.[9] The ultimate goal for all curative diabetes research is an effective long-lasting blood glucose normalisation and stabilisation for both type I and type II diabetic patients, at levels comparable to those achieved by intensive insulin therapy in the Diabetes Control and

[9] A recent study found that the total cost of diabetes (direct and indirect) is estimated to exceed €188 billion in 5 study countries (UK, Spain, Italy, France, Germany) of the EU alone. The absolute number of diabetics in the EU27 is expected to rise from approximately 33 million in 2010 to 38 million in 2030.

Complications Trial (DCCT). Despite improvements in insulin pharmaceutical efficacy and delivery methods, this approach still has major limitations, significantly impacting on patients' quality of life.

Scope: Proposals should develop one or more functional biomaterials for the long-term clinical efficacy of transplanted pancreatic islets, and the safe and reliable harvesting of cells from identified source(s), which facilitate highly sensitive identification/screening and sorting of isolated cells; allow for easy handling and safe storage of isolated cells and/or tissue engineering constructs; provide immunoprotection and facilitate construct grafting in target anatomical areas; as well as clinically-reflective in vitro models useful as indicators of long-term in vivo behaviour. A realistic endpoint of the project should be described and justified. Proposals should generate comprehensive pre-clinical data and after completion of the project, the material should be in an optimal position for entering clinical trials or, in case of innovative diagnostic tools, for the validation stage. Preclinical regulatory matters, including the investigational medicinal product dossier (IMPD), should be completed or taken to an advanced stage. Experimental protocols should be planned in accordance with the provisions of the Advanced Therapy Medicinal Products (ATMP) Regulation. Also, the standardisation and manufacturing process can be addressed including up-scaling and good manufacturing practice (GMP).

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Improvement of the quality of life of both Type I and Type II patients with diabetes mellitus;
- Reduced direct and indirect costs linked to the disease and its treatment, and wide availability of treatments;
- Implementation of relevant objectives of the European Innovation Partnership on Active and Healthy Ageing (COM (2012)83).

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 11 – 2015: Nanomedicine therapy for cancer

Specific challenge: Promising pre-clinical nano-medicine proof-of-concepts have been developed for the therapy of cancer, but their translation into clinical therapies remains a major challenge. An important bottleneck is up-scaling under Good Manufacturing Practice (GMP) conditions for the production of the nanomedicines from the pre-clinical laboratory scale to the quantity needed for clinical testing.

Scope: The aim is to translate promising novel nano-technology enabled therapies for cancer with pre-clinical proof-of-concept, from a pre-clinical lab stage up to Phase I clinical testing. The project shall start from an established pre-clinical proof-of-concept, with relevant efficacy and toxicity data. The project shall be focused on the translation process, so that ultimately new effective therapies can be introduced to the European healthcare market. An important aspect is the development of a pilot line for scaling-up the production of the

nanomedicines and the quality control, taking into account GMP and medical regulatory requirements. Projects may include the later stages of pre-clinical testing and Phase 1 clinical testing, but the latter is not a requirement. Nanopharmaceuticals may be manufactured with either a top-down or a bottom-up approach, using for example self-assembling technology. Applicants must describe, according to industrial criteria, how the various barriers for advancing their new therapy to clinical application will be overcome, including technical, IPR, competitive, commercial and regulatory criteria, with efficacy and toxicity. Attention must be paid to clinical trial design and the foreseen research and commercial path to market introduction has to be well outlined.

The research is to be implemented from TRL 4/5 and target TRL 6/7. Implemented as cross-KET activities.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 9 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Potential major improvement in clinical cancer therapy, thereby providing enhanced quality of life for patients (taking gender and other diversities into account).
- Potential reduced direct and indirect healthcare costs linked to the disease and its treatment.
- Accelerated introduction of new nanotechnology enabled cancer therapy, through robust manufacturing and quality control procedures for new nanotechnology enabled drugs.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 12 – 2015: Biomaterials for treatment and prevention of Alzheimer's disease

Specific challenge: An estimated 7.3 million Europeans between 30 and 99 years of age suffered from different types of dementias in the EU27 in 2006 (14.6 per 1 000 inhabitants), most of these being of the Alzheimer's variety. Innovative approaches based on biomaterials can improve the treatment and prevention of neurodegenerative disorders such as Alzheimer's disease.

Scope: Proposals should develop new multifunctional biomaterials, as part of eventual Medical Devices and Advanced Therapies, which aim to create, optimise, enhance, substitute or support preventive and therapeutic interventions in Alzheimer's disease. They can include: biocompatible and biodegradable biomaterials as part of minimally invasive treatments, theragnostic materials, and biocompatible materials that are easily degraded/cleared after completing their roles. The development of new drug candidates for Alzheimer's and clinical trials are excluded.

The development of new integrated experimental and computational approaches aimed to describe interface processes and their determinants should be considered as the key step for the design of safe and performing materials. Experimental protocols should be planned taking due account of current good laboratory practice (GLP) and ISO guidelines. Standardisation and manufacturing processes can be addressed, including upscaling, good manufacturing practice (GMP), process analytical technology (PAT), and regulatory work in respect of relevant regulations as appropriate.

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Improved quality of life due to minimally invasive action;
- Reduced direct and indirect costs linked to the disease and its treatment;
- Implementation of relevant objectives of the European Innovation Partnership on Active and Healthy Ageing (COM (2012) 83).

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Nanotechnology and Advanced Materials for low-carbon energy technologies and Energy Efficiency

The EU has made the commitment to reduce greenhouse gas emissions by 20% below 1999 levels by 2020, with a further reduction to at least 80% by 2050. In addition, there are legal targets that renewables should cover 20% of final energy by 2020, coupled with a 20% energy efficiency objective.

This challenge taps into nanotechnologies and advanced materials as foundations of low-carbon energy technologies which in turn support the EU objectives to increase the use of renewable energy sources and to significantly improve energy efficiency. The objective is to develop to a technology readiness demonstrating their potential for take-up in practical applications, which would be further pursued in technology or product development under the relevant societal challenge. The activities will make important contributions to implement the Materials Roadmap Enabling Low Carbon Energy Technologies, which is endorsed by the industrial initiative EMIRI (European Materials Industrial Research Initiative). Time to market for the new technologies should be assessed with a view to providing a contribution to the EU 2020 targets.

Proposals are invited against the following topics:

NMP 13 – 2014: Storage of energy produced by decentralised sources

Specific challenge: Electricity will increasingly be produced from sources which are geographically decentralised and/or are intermittent in their nature. There is thus an urgent need to increase the storage of energy, in order to improve on the stability of weak grids, to be able to intentionally island the electricity distribution, and to ensure the continuity of energy supply.

Scope: Proposals should develop innovative materials solutions that will make storage technologies more available, better performing and more cost effective. The solutions should exploit synergies between technologies as much as possible, contributing to the development of hybrid systems. Support from integrated computational/experimental approaches is envisaged. Activities addressing enhanced performance of chemical storage of hydrogen will be covered by the Fuel Cell and Hydrogen Joint Undertaking, and hence outside the scope of this topic.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Alleviation of geographical constraints for low carbon energy production, with increased efficiencies at a reduced cost;
- Reduction of the barriers to increase the penetration rate of distributed and /or intermittent renewable energy sources;
- Realisation of a new generation of energy technologies that will support the competitiveness of European industries through the realisation of a new generation of storage technologies based on advanced materials;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC (2011) 1609), and relevant objectives of the SET-Plan.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 14 – 2015: ERA-NET on Materials (including Materials for Energy)

Specific challenge: Maintaining Europe's position in research related to materials science and engineering requires concentrated action on common European research priorities in view of implementing joint initiatives. The Materials Roadmap Enabling Low Carbon Energy Technologies (SEC (2011)1609) was recently published in the context of the Strategic Energy Technology (SET) Plan. A strategic and industrial relevant approach to implement this roadmap needs to cover the entire research and innovation chain by pooling national research and innovation capacities, thereby mobilising European infrastructure networks as well as promoting education and training in materials research and innovation.

Scope: The proposed ERA-NET aims at coordinating the research efforts of the participating Member States, Associated States and Regions in the field of materials, continuing the activities started by M-ERA.NET, for materials research and innovation, especially enabling low carbon energy technologies, and to implement a joint transnational call for proposals (resulting in grants to third parties) with EU co-funding to fund multinational innovative research initiatives in this domain.

The Commission considers that proposals requesting a contribution from the EU of EUR 10 million would allow this specific challenge to be addressed appropriately. At least 50% of this amount should be used for implementing the Materials Roadmap Enabling Low Carbon Energy Technologies. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Synergies and coherence in key fields of industrial materials research at national and regional level;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC(2011)1609), and relevant objectives of the SET-Plan (COM (2009)519).

Type of action: ERA-NET (COFUND).

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 15 – 2015: Materials innovations for the optimisation of cooling in power plants

Specific challenge: Currently, power generation requires enormous amounts of cooling water, ranking second to the volume of water used for agriculture. As an example, a typical 500 MW thermal electricity plant equipped with a cooling tower evaporates 26 million litres of water per day (the equivalent of the daily water consumption of more than 43 000 EU families). Once-through cooling systems consume less water but withdraw significantly more: the same plant equipped with a once-through system would withdraw typically 1.4 billion litres of water per day, returning it to the water source about 10-15°C warmer. Such systems not only impose serious burdens on the local water management and the environment, but also limit the development of distributed power generation (foreseen by the SET plan) by their stringent requirements concerning cooling. The lack of adequate cooling water may even lead to power plant shutdowns.

Scope: Proposals should develop robust materials solutions for optimising cooling in thermal power plants by

- Allowing their functioning at higher temperatures, thus increasing their efficiency and reducing the amount of water withdrawn or consumed;
- Allowing the use of alternative cooling fluids (including air-based or hybrid coolants); and
- Increasing the available effective water supply, either by permitting to upgrade the quality of the water (e.g. using membranes) or by improving the robustness of the cooling equipment. Proposals should include activities to test the proposed solutions in relevant existing pilot plants.

Note: Thermal power plants include, inter alia, plants fired by coal, natural gas, liquid fossil fuels, as well as geothermal and solar thermal plants. Non-thermal power plants, such as wind turbines or PV plants/installations consume considerably less water during their operational life; projects should not focus on materials solutions to reduce the water consumption in such non-thermal plants.

Activities expected to focus on Technology Readiness Level 6.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Significant reduction of the amount of water, in particular cleaner water, used in thermal power plants within one or more application areas;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC(2011)1609); and relevant objectives of the SET-Plan (COM (2009)519).

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 16 – 2015: Extended in-service life of advanced functional materials in energy technologies (capture, conversion, storage and/or transmission of energy)

Specific challenge: Functional materials are enabling the large scale market penetration of secure, sustainable and affordable energy based on low-carbon, decentralised power generation. The benefits of using advanced functional materials can often be demonstrated in terms of, e.g., more efficient energy generation, storage or transmission, under controlled conditions. The high up-front investment costs of new power plants requires lifetimes of the order of 20 to 25 years, with minimal down and service time. However, not enough is known about the degradation of such materials during long-term service. This can seriously hamper the industrial uptake of such materials, increase initial investment costs due to the over-specification of the material requirements; or increase the exploitation costs, either by increased downtimes due to materials related failure or because of more intensive maintenance schedules.

Scope: Proposals should investigate the long-term in-service degradation of functional materials that have already demonstrated enhanced performance in terms of energy capture, conversion, storage and/or transmission, and the capability of a production at a scale that could warrant an industrial uptake. Proposals must include relevant modelling and testing under realistic conditions at pilot level. They should focus on improving the practical understanding of long-term in-service degradation on the performance of the functional material and its impact on the overall performance of the technology components and systems. The development of improved materials solutions, as well as relevant roadmaps and a catalogue of good practices, should be included.

Activities expected to focus on Technology Readiness Level 6.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Reduction of the capital (CAPEX) and/or operating (OPEX) expenditures in specific low carbon energy technologies;
- Implementation of relevant parts of the Materials Roadmap Enabling Low Carbon Energy Technologies (SEC(2011)1609); and relevant objectives of the SET-Plan (COM(2009)519).

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 17 – 2014: Post-lithium ion batteries for electric automotive applications

This topic is a contribution to the Green Vehicles initiative

Specific challenge: The electrification of road transport is a key towards sustainable and environmentally friendly mobility of persons and transport of goods, in particular for short range transport and transport in urban areas. In order to reach this goal it is important to develop improved cost competitive and sustainable storage technologies for Electrified Vehicles (EV) achieving significantly improved performance with respect to current lithium-ion electrochemical storage technology, to allow the production of EVs that more closely

match the performance of current internal combustion vehicles (e.g. and in particular considering the driving range). This challenge is complementary to a separate one present in the "Transport Challenges" Work Programme.[10] This is also in line with the Roadmap of the European Green Vehicle Initiative (EGVI). Research and innovation should build on the progress already obtained through previous projects, particularly those funded within the Green Car Public Private Partnership. It is however important for the European competitiveness that the next generation of batteries will be "made", i.e. developed and produced in Europe.

Scope: To achieve progress well beyond current lithium-ion cell technologies, various key factors have to be improved at the same time, such as: energy density, power density, the ability to work under severe thermal conditions, charging speed, and inherent safety of the battery cells including crash and abuse conditions. And the ageing of the new chemistries has to be thoroughly understood and improved, in order to achieve a longer battery lifetime. In addition, the future battery has to have a competitive cost; it has also to be produced in an environmental friendly way, considering the availability of raw materials and the batteries' recycling potential, as well as a sound life cycle assessment. And the knowledge on production-technology and -capacity of cells, packs and systems should be made available. The scope may be reached e.g. by addressing new chemistries that allow high-energy densities, and by developing related specific new materials e.g. for cathodes and electrolytes. In order to accelerate the industrial take-up of the proposed solution, the development of prototypes should be included to show clear progress beyond existing post lithium-ion technology in terms of durability, cyclability and energy density, with consideration of scalability up to full scale for automotive applications.

Activities expected to focus on Technology Readiness Level 4.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Significant improvements of the usability of EVs, with extended driving range and improved battery durability (recharging, cyclability and safety) obtainable at competitive costs. The energy density of the proposed new batteries should reach at least twice the energy density in comparison to the best in class Li-Ion technology at the same power density;
- Better acceptance of EV in society, and thus contribution to the improvements of sustainable transport, reducing pollution and noise in urban areas;
- European competitiveness through development of new key technology and related production capacities.

Type of action: Research and Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[10] GV 1-2014 "Next generation of competitive lithium ion batteries to meet customer expectations"

Exploiting the cross-sector potential of Nanotechnologies and Advanced materials to drive competitiveness and sustainability

This challenge addresses the development of nanotechnologies and advanced materials with a view to their use in several different applications and economic sectors, with the dual aim of boosting the competitiveness of European industry and making contributions to a sustainable economy. This includes contributions to European culture and creativity through novel materials. The emphasis is on enabling multi-sectorial potential, by developing and advancing technological readiness of solutions with break-through potential. International cooperation in this general area is particularly appropriate.

Proposals are invited against the following topics:

NMP 18 – 2014: Materials solutions for use in the creative industry sector

Specific challenge: The recent communication 'Promoting cultural and creative sectors for growth and jobs in the EU' highlighted the competitive advantage that creative and cultural inputs bring to the European industries. The most obvious example is the wider use of design in manufacturing industries, adding value to products, services, processes and market structures. Firms spending twice the average amount on creative inputs are 25% more likely to introduce product innovations (COM(2012)537). To promote design-driven innovation, a number of action lines have been endorsed by the Commission, including integrating design into research and development and promoting new collaborative innovation strategies ('Implementing an Action Plan for Design-Driven Innovation', SWD(2013)380).

An innovative, design-driven, sustainable approach in conceiving, developing, producing, using and recycling materials can be effective in strengthening the competiveness and success of the European creative industries linked to manufacturing (e.g. architecture, automotive, art, crafts, supports for cultural items, decoration, fashion, furniture, lighting, interior design materials and products, jewels, luxury, media supports, publishing, sport and toys), adding value to products and processes also by 'intangible' factors (e.g. trend translation, enhanced sensations, values) .

Scope: Proposals should address the development of innovative material solutions for use in the creative industry sectors based on waste or process by-products to produce new materials or adopting bio-mimetic approaches. A sustainable and socially responsible approach to reduce energy consumption and environmental impact should be clearly demonstrated. Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes (in compliance with European Commission Communication 2006/C323/01), but convincingly demonstrating scalability towards industrial needs.

In order to ensure the industrial relevance and impact of the research efforts, the cost effectiveness and commercial potential of the innovative technologies compared to state-of-the-art solutions currently available on the market should be convincingly assessed in the proposal. The active participation of designers, societal stakeholders, materials suppliers, manufacturers and end users of the resulting products represents an added value and this will be reflected in the second stage of the evaluation.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Innovative sustainable material solutions for products with lower environmental footprint for use in the creative industry sector;
- Promoting new collaborative innovation strategies and practices along the value chain by reducing the gaps between the material developers, designers, producers and consumers;
- Integrating design into research and development to better support commercial and societal applications benefiting from a strong user orientation;
- New business opportunities for the European industry via novel material solutions, with suitable-for-use properties and controlled environmental impact; and
- Contribute to achieving the relevant EU policy objectives in COM(2012)537, 'Promoting cultural and creative sectors for growth and jobs in the EU'.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 19 – 2015: Materials for severe operating conditions, including added-value functionalities

Specific challenge: The need to develop materials which can perform well in severe operating environments is increasing with advances in technology and requirements for higher efficiency in all areas such as manufacturing, energy, transport and communications, deep-sea technologies etc. Another important driver for advanced functionalities, e.g. self-diagnosis and self-healing, comes from the incorporation of nanoscale and molecular materials components. This poses a major challenge for materials science, and requires a fundamental understanding of how the processing, microstructure, nanostructure and properties of such material interact in order to enhance their response under more severe conditions.

The general aim is to develop new products or components with a step change in efficiency or performance compared to existing ones, for operation in e.g. high radiation environments, highly corrosive environments, low temperature environments, deep sea or space environments, or other extreme climate conditions.

Scope: Projects should develop bulk materials that can function within an aggressive environment without property degradation, synthesise new structures with useful properties, and force chemical reactions that normally result in damage to proceed along selected pathways that are either benign or initiate the self-repair of damage.

Projects should include appropriate numerical tools (e.g. density functional theory, molecular dynamics) to capture the multi-scale evolution of damage; and predictive modelling tools for

materials operating in extreme environments. Standardisation and/or the production of (certified) reference materials may also be addressed as an integrated part of the proposal. Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes, but convincingly demonstrating scalability towards industrial needs. The cost effectiveness and commercial potential of the innovative technologies compared to state-of-the-art solutions currently available on the market should be quantified during the project, with the involvement of end users. The environmental sustainability and end-of-life considerations of each proposed solution should also be assessed with special emphasis on efficient materials usage.

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Increase in competitiveness and sustainability of European industry through high value products and manufacturing processes in the application sector;
- Employment and training through engagement in cutting-edge technologies.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 20 – 2014: Widening materials models

Specific challenge: The future of the European industry relies inter alia on a strong modelling capacity. An efficient approach is needed to shorten the development process of materials-enabled products, being a key to the global competitiveness of industry. Existing models describe the behaviour of different physical entities, and thus several models need to be linked to cover all scales and arrive at industrial relevant results. The coverage of a single model should be expanded to reduce the necessity of linking. In addition, today's material models often lack accuracy, especially when describing product properties connected to the material behaviour.

Scope: Proposals should elaborate the physics and chemistry involved in an existing model to extend the length and time scales to which this model can be applied. The model to be expanded can be an electronic, atomistic, mesoscopic or continuum scale model; where the discrete electronic, atomistic and mesoscopic model describes the behaviour of electrons, atoms and nanoparticles/grains respectively, and a continuum model describes the behaviour of continuum unit cells.[11] There is a special need for the expansion of discrete mesoscopic models. Proof of the possibility to design new materials and/or materials processes with the expanded physics/chemistry must be delivered within the project.

[11] http://ec.europa.eu/research/industrial_technologies/pdf/modelling-brochure_en.pdf

The extended model should be implemented in a code integrated in a multi-scale approach available to end-users and demonstrate the reduced need of linking due to the extended coverage of the model.

The proposals should include interface design to facilitate the future implementation in larger and extendable framework architecture. Proposals should contain a series of model validation in which the model is validated against a chain of experimental data of increasing complexity relevant to materials design leading up to and including realistic test cases. These data should either be collected during the project or exist already. The extended model should be implemented in a code integrated in a multi-scale approach available to end-users. As part of each project, industrial end-users should assess this code on predefined industrial test cases, to guarantee industrial relevance.

Activities expected to focus on Technology Readiness Level 5. In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), as well as with the conclusions of the Materials Summit 2013, international cooperation is encouraged, in particular with the USA.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Rapid deployment of lower-cost advanced materials solutions through predictive design of novel materials and production routes optimised for specified applications (e.g. properties and functionality minimise the environmental impact, reduced risk of product failure and increased life);

- Improved control of materials production and an improved control of concerned industrial products and processes.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 21 – 2014: Materials-based solutions for the protection or preservation of European cultural heritage

Specific challenge: Europe has significant cultural diversity together with exceptional ancient architecture, built environment and artefact collections. However time, exposure and environmental changes present significant threats to this cultural heritage (which is one of the assets on which the tourism-related industry relies).

Scope: Projects should develop one or more functional materials or highly innovative techniques in the restoration and preventive conservation of works of art. These new techniques may be based on a more in-depth knowledge of the degradation mechanisms in the materials used in previous conservation actions. They will ensure long term protection and security of cultural heritage, taking into account environmental and human risk factors. An environmental impact assessment of the new materials is to be included, to ensure development of sustainable and compatible materials and methods. A multidisciplinary approach should allow the development of practicable methodologies. Activities should focus

on innovative and long lasting solutions in the conservation of cultural assets with historical and/or artistic value.

Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes but demonstrating scalability towards industrial needs. Dedicated multiscale modelling, tailored (e.g. interface) characterisation, standardisation and/or the production of (certified) reference materials may also be covered in projects.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Practical and affordable solutions in terms of cost and/or complexity of operation by those who will use the materials and techniques developed;
- Contribution to achieving EU policies, in line with the Lisbon Treaty recommendation to take actions on a global scale to ensure that Europe's cultural heritage is conserved, safeguarded and enhanced (Article 3).

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 22 – 2015: Fibre-based materials for non-clothing applications

Specific challenge: New approaches to improve the functionality of materials are important for the sustainable development of Europe's competitiveness. Fibre-based materials for technical, high -value, high -performance products at reasonable prices, with improved safety and functionality, represent a challenge for materials science and engineering.

Scope: Proposals should aim to develop engineered fibre-based materials for novel, smart, high-value and high-performance non-clothing parts and products for technical and industrial use. New approaches and production technologies will enable a broader spectrum of industrial applications, taking into account, as appropriate, issues of sustainability, recycling, safety, energy, and self-cleaning or other functionalities. Portable final products may also be considered.

In order to ensure the industrial relevance of the research, the cost effectiveness and commercial potential of the innovative technologies compared to state-of-the-art solutions currently available on the market should be quantitatively monitored during the project. A

market estimate should be outlined in proposals and developed in projects, with recommendations for future industrial uptake.

Proof of concept in terms of product and/or process must be delivered within the project, excluding commercially usable prototypes, but convincingly demonstrating scalability towards industrial needs. Dedicated multiscale modelling and characterisation, and standardisation or the production of (certified) reference materials may also be addressed.

Activities expected to focus on Technology Readiness Level 5-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Increase in competitiveness and sustainability of European multiple sectors industry through innovative high value products and manufacturing processes;
- Employment and training through engagement in cutting edge technologies in various sectors, e.g. transport, construction, sport and leisure etc.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 23 – 2015: Novel materials by design for substituting critical materials

Specific challenge: Many technologies with significant socio-economic benefits face material requirements that are, or may be, problematic due to their instable, insecure or price-volatile supply. Research is needed in particular to improve our fundamental understanding of the development of new material solutions with a reduced or completely eliminated critical content, while maintaining or enhancing the performance of the materials, components and products. Examples may be the critical raw materials (see COM(2011)25 and related documents) or those materials which may be hazardous or pose a risk to human health and/or the environment.

Scope: Proposals are called for to investigate the development of such materials by rational design, with focus on the combination of theory with large-scale computational screening. Validation by experimental methods should be included.

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation according to the current rules of participation is encouraged, in particular with Japan and the United States of America. The quality of the international cooperation will be rewarded in the evaluation of the proposal.

Activities expected to focus on Technology Readiness Level 3-4.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Reduced use or substitution of critical materials for well-defined technologies;

- Improved performance of industrial products in the longer term;
- Safer and/or more sustainable materials, components and products;
- Contribute to achieving the EU policy COM(2011)25: Tackling the challenges in commodity markets and on raw materials; and other relevant EU policies.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 24 – 2015: Low-energy solutions for drinking water production

Specific challenge: Low-energy solutions are badly needed for water softening and especially for water desalination. The present technologies for large scale desalination of seawater are stuck at energy consumption rates around 3 kWh/m^3 whilst the target has been set at 1 kWh/m^3 years ago.

Scope: Approaches that may bring better performance and lower energy use may be based on (but are not limited to) a combination of membrane filtration (reverse osmosis) and applying electric potential, electrochemical membrane processes, membrane distillation, selective ion conducting materials, or crystallisation of clathrates. Projects should develop integrated solutions or combinations of technologies that come closer to the mentioned target.

Projects should aim at developing pilot plants demonstrating the low energy consumption as well as the overall competitiveness of the technology.

The implementation of this proposal is intended to start at Technology Readiness Levels 4-5, target Technology Readiness Levels 6-7.

In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in particular with developing countries.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Contribution to one of the main global societal issues – access to safe and pure water;
- Improved performance, energy efficiency and usability of high-performance water purification systems;
- Benefit the European water purification industry through new product developments in this important growth market.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 25 – 2014/2015: Accelerating the uptake of nanotechnologies, advanced materials or advanced manufacturing and processing technologies by SMEs

Specific challenge: Research results should be taken up by industry, harvesting the hitherto untapped potential of nanotechnologies, advanced materials and advanced manufacturing and processing technologies. The goal is to create added value by creatively combining existing research results with other necessary elements,[12] to transfer results across sectors where applicable, to accelerate innovation and eventually create profit or other benefits. The research should bring the technology and production to industrial readiness and maturity for commercialisation after the project.

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

In phase 1, a feasibility study shall be developed verifying the technological/practical as well as economic viability of an innovation idea/concept with considerable novelty to the industry sector in which it is presented (new products, processes, design, services and technologies or new market applications of existing technologies). The activities could, for example, comprise risk assessment, market study, user involvement, Intellectual Property (IP) management, innovation strategy development, partner search, feasibility of concept and the like to establish a solid high-potential innovation project aligned to the enterprise strategy and with a European dimension. Bottlenecks in the ability to increase profitability of the enterprise through innovation shall be detected and analysed during phase 1 and addressed during phase 2 to increase the return in investment in innovation activities. The proposal should contain an initial business plan based on the proposed idea/concept.

The proposal should give the specifications of the elaborated business plan, which is to be the outcome of the project and the criteria for success.

Funding will be provided in the form of a lump sum of EUR 50 000. Projects should last around 6 months.

In phase 2, innovation projects will be supported that address the specific challenge and that demonstrate high potential in terms of company competitiveness and growth underpinned by a strategic business plan. Activities should focus on innovation activities such as demonstration, testing, prototyping, piloting, scaling-up, miniaturisation, design, market replication and the like aiming to bring an innovation idea (product, process, service etc) to industrial readiness and maturity for market introduction, but may also include some research. For technological innovation a Technology Readiness Levels of 6 or above (or similar for non-technological innovations) are envisaged; please see part G of the General Annexes.

Proposals shall be based on an elaborated business plan either developed through phase 1 or another means. Particular attention must be paid to IP protection and ownership; applicants will have to present convincing measures to ensure the possibility of commercial exploitation ('freedom to operate').

[12] http://ec.europa.eu/enterprise/policies/innovation/files/swd-2012-458_en.pdf

Proposals shall contain a specification for the outcome of the project, including a first commercialisation plan, and criteria for success.

The Commission considers that proposals requesting a contribution from the EU between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should last between 12 and 24 months.

In addition, in phase 3, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme.

Successful beneficiaries will be offered coaching and mentoring support during phase 1 and phase 2. This service will be accessible via the Enterprise Europe Network and delivered by a dedicated coach through consultation and signposting to the beneficiaries. The coaches will be recruited from a central database managed by the Commission and have all fulfilled stringent criteria with regards to business experience and competencies. Throughout the three phases of the instrument, the Network will complement the coaching support by providing access to its innovation and internationalisation service offering. This could include, for example, depending on the need of the SME, support in identifying growth potential, developing a growth plan and maximising it through internationalisation; strengthening the leadership and management skills of individuals in the senior management team and developing in-house coaching capacity; developing a marketing strategy or raising external finance.

Expected impact:

- Enhancing profitability and growth performance of SMEs by combining and transferring new and existing knowledge into innovative, disruptive and competitive solutions seizing European and global business opportunities.

- Market uptake and distribution of innovations tackling the commercial uptake of nanotechnologies, advanced materials and advanced production technologies in a sustainable way.

- Increase of private investment in innovation, notably leverage of private co-investor and/or follow-up investments.

- The expected impact should be clearly described in qualitative and quantitative terms (e.g. on turnover, employment, market seize, IP management, sales, return on investment and profit).

Type of action: SME Instrument (70% funding)

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Safety of nanotechnology-based applications and support for the development of regulation

Nanotechnology-based applications will substantially improve the performance of many products through the unique properties of engineered nanoparticles. The same properties, however, give rise to questions and concerns with regard to potential health and safety risks.

To support the safe development of nanotechnologies, these risks should be managed by identifying the hazards, understanding and predicting the potential adverse effects; and by measuring, predicting and controlling exposure. Risk management should become an integral part of the culture of the organisations involved in the supply chain, including regulatory support and risk governance. The objective is to support methods, techniques and equipment for material characterisation, hazard identification, occupational exposure assessment and risk reduction and mitigation and their demonstration. The environmental fate and end-of-life treatment of products and waste containing nanomaterials are also of prime importance.

All projects under this heading should align with the EU Nanosafety Cluster and other international activities (e.g. EU-US communities of research, OECD-WPMN and CEN/ISO) in order to facilitate research cohesion and integration, and the advancement of the EU Nanosafety Cluster goals and agenda. In line with the objectives of the Union's strategy for international cooperation in research and innovation (COM(2012)497), international cooperation is encouraged, in all topics under this technology challenge, in particular with the leading nanotechnology developing nations, such as the US, Canada, Australia, Korea, Japan, China and Brazil.

In addition to the need for risk assessment and management, dealt with under this challenge, responsible governance is emerging as a determining factor of future impact of nanotechnologies on society and the economy. This need is dealt with under the following challenge on KET support.

Proposals are invited against the following topics:

NMP 26 – 2014: Joint EU & MS activity on the next phase of research in support of regulation “NANOREG II"

Specific challenge: Regulation of the nanomaterials market evolves parallel to technology development and societal requirements. The running project NANOREG addresses regulatory research for the quantification of hazard and exposure, a necessary step in regulatory risk assessment. The commercial viability of nanomaterial development in the EU is conditional on new nanomaterials meeting current and future regulatory requirements and should be based on cutting-edge technology with regard to the next steps of risk management and risk mitigation. Demonstration of integration of such technology into the design of new nanomaterials and products and their applications is a major challenge and the main objective of this joint action.

Scope:

(1) To develop and demonstrate Safe-by-Design regulatory approaches for nanomaterial development.

(2) To validate the tools and methodology, as well as their background data-sets, that will lead to the manufacture of novel, inherently safe nanomaterials.

(3) To address barriers for the application of Safe-by-Design as standard industry practice.

The project should seek to establish principles for grouping strategies for nanomaterials according to their assumed modes of toxicological action for regulatory purposes. Out of each group, a few representative materials should be selected and a toxicological profile shall be assessed. The scope may include novel materials, coated materials and self-assembled materials, nanomaterials with different surface functionalisation, and third generation particles. The project should take into account future dossier requirements under REACH, or other related EU legislation, to limit the required additional information, especially animal testing, to the essential minimum. Active participation of industrial partners is strongly encouraged to establish strong industry-authorities collaboration and the partners should conclude a results communication policy before the start of the project. This collaboration should be complemented by solid mechanisms networking state and private laboratories in nanotechnology toxicity testing and exposure control.

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that, in addition to requested EU contribution between EUR 6 and 10 million, proposals should gather sufficient resources from EU Member States and Associated Countries to allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact: The project is expected to:

- Strengthen seamless collaboration among authorities of the EU Member States and Associated Countries with regard to the knowledge required for appropriate risk assessment and management in this field given the fast development of the market;

- Bring together the activities of national authorities responsible for consumer and worker protection, public health, and the environment including chemical safety and all other relevant authorities covering the whole value;

- Coordinate regulatory oriented activities of, or cooperate with, other on-going projects on toxicity testing, on decision making for material characterisation and testing protocols, and for data management; and

- Integrate its work with OECD-WPMN, CEN[13] and ISO, and other European funded projects in the nanosafety cluster.

Type of action: Research and Innovation Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

[13] See Mandate M/461 addressed by the European Commission to CEN/CENELEC and ETSI. http://www.cen.eu/cen/Sectors/Sectors/Nanotechnologies/Documents/M461.pdf

NMP 27 – 2014: Coordination of EU and international efforts in safety of nanotechnology

Specific challenge: The development of a novel safety culture for the nanomaterial research and engineering community, and the industry producing engineered nanomaterials and nano-enabled products is a significant challenge in the coming years. Incorporating the safety-by-design as an integral part of the core research activities of nano material sciences and the production of these materials and products would be a major step forward in assuring nanosafety. Such activities are currently on going in the EU and several other industrialised countries in a rather fragmented manner, necessitating specifically oriented action beyond the efforts foreseen in the context of individual projects. The increasing efforts of emerging economies and emerging science countries should also be integrated with the leading actors in the area of nanosafety.

Scope: The main aim is to bring together EU Member and Associated states and international efforts for risk assessment, management and governance by streamlining data acquisition, collection and management on regulatory oriented toxicology testing of nanomaterial, exposure monitoring, LCA, and disposal and treatment of waste nanomaterials. The coordination may focus on one or more of the following tracks:

- Coordination of EU and international efforts in support of regulation, in particular within the context of NANOREG and NANOREG II, which is a major undertaking jointly funded by FP7, EU Member States, FP7 Associated States and industry, and of the work carried out by OECD-WPMN and standardisation bodies such as ISO or CEN;

- Expanding the international dimension of EU nano-safety research e.g. through networking of researchers, twinning of projects or creation of Communities of Research with the objective of sharing of best practises and harmonising test methods.

- Widening the coordination of MS, AS and regional R&D efforts aimed at management of nano-related risks with the objective of pooling resources for a transnational programme of nano-safety research along the lines of the nanosafety cluster Strategic Research Agenda 2015-2020.

The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

• By exploiting synergies with, mainly national European but also world-wide, activities aiming at support to regulation, the project should lead to joint projects, twinned projects and global networks facilitating the goal of risk management and incorporating risk assessment in the early stages of product or process design

• The project should combine efforts with those of the Nanoreg project so that the expected datasets from the latter be complemented and cross validated with similar datasets from other projects running globally in order to reach OECD - MAD (Mutually Accepted Data) status identifying and brushing-out any inconsistencies.

• The impact of the NANOREG initiative, in establishing a seamless cooperation between industry, including risk engineering, and authorities, should be enhanced and expanded to include global market leaders.

- The project is expected to promote standardisation at international level.

Type of action: Coordination and Support Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 28 – 2014: Assessment of environmental fate of nanomaterials

Specific challenge: A potential nanomaterial risk for humans and the environment is present only when both exposure and a hazard potential of the nanomaterial exist. The challenge is to address the prediction of environmental distribution, concentration and form (speciation) of nanomaterials. It includes release and exposure studies using laboratory, field and model simulations of possible release and transformation of nanomaterials transport and fate, availability and bioaccumulation potential, to allow early assessment of potential exposure and facilitate safe product design.

Scope: The testing and modelling framework to be developed must allow prediction of the release and fate of nanomaterials over relevant whole product chains from manufacturing, downstream application and use, including waste and accidents, consumer use, to end-of-life recycling or disposal and final environmental fate. The predictive framework to be developed should include basic geographical and demographic considerations for uses, and address the physico-chemical characterisation at the release sources as well as the identification of the main mechanisms and nanomaterial properties driving their transformation and fate. The framework should enable predictive mapping of zones of accumulations and exposure potential (including the final aging transformations, forms and uptake availabilities) of nanomaterials in these "environmental sinks" and hot spots.

A close collaboration with stakeholders and different industries should be envisaged, to enhance realistic modelling and testing.

Activities expected to focus on Technology Readiness Level 4.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- understanding and quantifying nanomaterial release from manufacturing, use and end-of-life stages in relevant product value chains

- an overall validated framework that ensures the completeness and quality of information and data needed for understanding and predictive modelling of environmental transport and transformation

- understanding of the interplay of the different transformation, transport, and aging mechanisms determining environmental exposure

- enabling safer product design guidance, comprehensive laboratory and field test procedures all along the product chain, including metrology and standardisation issues for characterisation, and addressing international harmonisation and regulation

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 29 – 2015: Increasing the capacity to perform nano-safety assessment

Specific challenge: Systems biology, high throughput screening and toxicogenomics approaches have the potential to revolutionise how chemical substances, including nanomaterials, are assessed for regulatory and risk management purposes. A paradigm shift in toxicology using innovative techniques such as High Thoughput Screening (HTS) approaches, Toxicogenomics and High Content Analysis (HCA) is being established. With such approaches it is possible to identify underlying affected pathways (so called 'toxicity pathways'). The challenge is to develop and demonstrate a mechanism-based understanding of toxicity, which will enable improved toxicity testing by identifying novel endpoints essential to tailor-made first tier hazard and risk assessment of novel and emerging materials.

Scope: Projects should enhance the understanding of the mechanisms underlying any observed adverse effects from engineered nanomaterials, and ultimately link the potential for such adverse effects to specific physical or chemical nano scale properties.

They should establish and demonstrate the basis for the development of appropriate tools to maximise read across (taxa and nano properties) and assess which tools or endpoints may not necessarily be applicable across the board. These approaches should aim to support the grouping of nanomaterials, to help in developing intelligent testing strategies and identifying "nanomaterials or properties of concern" that need to be tested more thoroughly.

Activities expected to focus on Technology Readiness Level 4.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- New screening tools to enhance the efficiency of end-rate at which nanomaterial hazard profiling can be performed
- Facilitate faster definition of nanomaterials toxicity mechanisms
- Enable "safer by design" approaches, tailored to stakeholders' needs (modellers, industry and regulators)
- Data in a recognised and accessible database for use beyond the lifetime of the project
- Provision of solutions to the long-term challenges of nanosafety and nanoregulation

Type of action: Research and Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 30 – 2015: Next generation tools for risk governance of nanomaterials

Specific challenge: The conventional risk assessment approach, i.e. deriving no-effect levels or limit values from dose-effect relationships is inadequate for enabling safe use for newly developed materials in the fast moving market of nanomaterials. The challenge is to build a state-of-the art and flexible risk banding tool to keep pace with developments in innovation and risk research by harvesting and implementing results from concluded, ongoing and planned research in next generation risk governance frameworks. For nanotechnology, as with

any new and rapidly evolving technology, analysis of risk is technically and methodologically limited, and thus associated with a high degree of uncertainty which should be understood and quantified. Stakeholders' concerns, including those of the insurance sector, and risk perception should be understood and communicated. Risk acceptance is strongly affected by a clear understanding of the risks, the benefits and the uncertainties perceived on equity and trust.

Scope: Research should focus on the testing, the calibration and the further development of risk prioritisation (or banding) tools for both human and environmental risks, with emphasis on:

a) the use of inputs from computational toxicology and/ or 'high concern grouping approaches' in risk banding tools to identify potential hot spots for risk,

b) Scientific foundation of the 'risk bands', by linking the hazard based with 'dose' relevant exposure banding,

c) Inclusion of data and monitoring strategies on the efficacy of risk mitigation measures and

d) Alignment with user capacities and needs, including ensuring the ability of the nanomaterial sector to avail of risk transfer/insurance.

The selected project should identify the major processes of individual and societal decision making, placing particular attention on the aspect of uncertainty. To ensure the highest possible quality in regulatory decision making, emphasis should be given to the development of guidance for important issues in Risk Assessment, based on in-depth analysis of the current scientific basis concerning the addressed hazards and the possible exposure, and joining forces with other projects

Activities expected to focus on Technology Readiness Level 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- A framework for the risk governance of nanomaterials entering the market by developing tools for risk appraisal, risk transfer and guidance for risk communication;

- Demonstration in specific industrial settings or industrial sectors of the feasibility of the developed approaches and tools through worked examples as case studies and pilots with outcomes as guidance, good practices and tools for risk management and risk communication;

- Leveraging and building on current knowledge related to hazard mapping, exposure and control banding and risk prioritization as well on inter/national and company level risk governance and risk dialogue efforts with key stakeholders including regulators and insurers.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Addressing generic needs in support of governance, standards, models and structuring in nanotechnology, advanced materials and advanced manufacturing and processing

To deploy the key enabling technologies of nanotechnology, advanced materials and advanced manufacturing and processing for the benefit of European industry and society, it is essential to address a number of general, structural needs. These needs are in areas including infrastructure, metrology and standards, skills and networking, dissemination and communication issues, and business models. Sources of funding other than Horizon 2020, such as structural funds, are vital and appropriate links will be explored.

In order to better align the research and innovation outcomes to the values, needs and expectations of European society, the concept of Mobilisation and Mutual Learning (MML) Action Plans or Platforms will be supported.[14]

The increasingly important international dimension of industrial research requires a proactive approach to working with third countries in these fields and this will also be explored and supported.

Proposals are invited against the following topics:

NMP 31 – 2014: Novel visualisation tools for enhanced nanotechnology awareness

Specific challenge: Recent surveys show that the awareness in the public about nanotechnology based products is very low and that awareness without detailed information creates insecurity. In that respect, novel visualization tools are a key element for enhanced communication and improvement of societal understanding of nanotechnology.

Scope: The major efforts of the project should be dedicated to the development of content aimed at enhanced communication, outreach and balanced information on nanotechnology with youngsters, civil society organisations, the media, and the lay public as the target audience. The content should be made available using novel visualisation, which is not only characterised by a geometry but also has attributes, semantics, and possibly interaction with time. The content should be built either from existing data (e.g. from finished or on-going FP7 projects) or from new data (e.g. from modelling efforts on nano-toxicology phenomena). The projects should make use of commercially available technologies to create an interactive environment for the information visualization. This can be a single user environment (e.g. immersion), but the project should also have a significant component where the environment can be experienced collectively (e.g. 3D projection techniques). Gender aspects should be taken into account, avoiding stereotypes. Furthermore, the project should also involve appropriate disciplines of Socio-Economic Sciences and Humanities.

Media produced within the project should be made available under a public copyright license such as e.g. under a creative commons license.

The Commission considers that proposals requesting a contribution from the EU between EUR 500 000 and 1 million would allow this specific challenge to be addressed

[14] A Mobilisation and Mutual Learning (MML) Action Plan or Platform is a mechanism to bring together a wide range of actors and pool their knowledge and experience, and to facilitate mutual understanding and develop joint solutions and research agendas to address societal challenges.

appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- contribute effectively in raising the awareness of Europe's citizens, and in particular the target groups mentioned above, on nanotechnology and enhance their understanding through media available under a public copyright licence (e.g. a creative common license);

- enhance the use of novel visualisation techniques beyond the project lifetime for outreach activities in the area of nanotechnologies

- support, beyond the lifetime of the project, the communication and education activities of various stakeholders: researchers, industrialists, investors, museums and/or schools;

- enhance support to good governance in nanotechnology;

- contribute to the implementation of the European Commission's Action Plan for Nanotechnology.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 32 – 2015: Societal engagement on responsible nanotechnology

Specific challenge: Transparency, knowledge and societal engagement are key factors in addressing societal concerns regarding the use of nanotechnology, including nanomaterials. An essential element of a safe and responsible nanotechnology governance is an effective and informed dialogue with all stakeholders, enhancing public confidence in nanotechnologies.

Scope: The proposed action should identify current best practices in societal engagement to establish a multi-stakeholder platform at EU and/or at national level in a number of EU Member States and Associated Countries, involving a balanced representation of researchers, Civil Society Organisations (CSOs) and Non-Governmental Organisations (NGOs), scientists in the field of Social Sciences and Humanities, industry and policy-makers to develop a shared understanding of the current and potential future (economic, social and environmental) benefits and risks of advancing nanotechnology. This action is to be based on the concept of Mobilisation & Mutual Learning (MML) Platforms[15].

The two main activities to be undertaken within this platform are a series of multi-stakeholder dialogues and training activities to address knowledge gaps between various types of actors and potential co-production of knowledge. These dialogue meetings should consider the various questions of interest or information needs that emerge across the entire value chain (from R&D to production and distribution to use and waste processing or recycling), discuss how to employ nanotechnologies to the benefit of society addressing societal challenges and identifying desired fields of innovation, whilst contributing to Responsible Research and Innovation. The outcomes of the dialogue are to be fed back into policy making and research

[15] A Mobilisation and Mutual Learning (MML) Action Plan or Platform typically includes following types of partners: research performing and/or funding organisations, civil society organisations, industry/business and policy-makers and should involve a wide range of EU Member States or Associated countries. The MML Action Plan or Platform should have a minimum duration of three years.

and innovation processes with joint stakeholder undertakings. In order to ensure that all participants have a common knowledge base, various training or information sessions should be organised to address any knowledge gaps that may impede a constructive dialogue.
The design of this platform and its activities should take into account and build on previous FP6 and FP7 activities and relevant EU and international policies and initiatives in this field. Gender balance should be taken into account in the make-up of the platform and gender should be embedded in the dialogues on the content and impacts of nanotechnology research.

The Commission considers that proposals requesting a contribution from the EU between EUR 500 000 and 1 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- The direct and sustainable impact of this action will be to enhance the interaction between society, science and nanotechnologies in order to contribute to a responsible nanotechnology research and innovation at EU and national policy level and research processes.

- Involving civil society, social sciences and humanities, and industry groups in decision-making procedures and/or societal dialogue and engagement on nanotechnologies will increase awareness, enhance understanding between stakeholders' on their positions, needs, expectations and concerns, and enhance trust between them.

- The outcomes of the multi-stakeholder platform will contribute to responsible policy-making, better acceptability of nanotechnologies outcomes, a more inclusive European society and will lead to a roadmap to enhance societal engagement in nanotechnology.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 33 – 2014: The Materials "Common House"

Specific challenge: The fragmentation of research efforts has long been identified as a major European weakness. A significant part of national R&D budgets is spent without substantial coordination across the Union, a significant waste of resources at a time of shrinking funding possibilities.

A dynamic structure, following materials research and innovation across the European Union, is called for. The goal is to make Europe a more coherent system, and also to help in better coordinating future EU materials activities with those in Member States, Associated Countries, industry and academia, to avoid duplications and gaps.

Scope: Support to a monitoring system and a forum to debate developments and needs, identify gaps and opportunities, establish priorities in order to create a sound, authoritative, consensual, science-based, economy pushed, society-driven Europe-wide knowledge base of materials science and engineering. Synergy with or use of present structures and existing schemes is welcome.

The proposal for the support action should describe the expected level of detail in the study, definitions and limitations, the parameters to be observed, and the targeted application fields. The support action may include assessment, benchmarking, road mapping, foresight, coordination, organisation of events, and communication, and give indications in which

application areas research and innovation may have most impact. A study of activities carried out within and outside Horizon 2020, through other EU schemes (European Structural and Investment Funds and national activities etc.) may be included. The proposal should also provide elements for a constant monitoring system, as well as success cases and best practices stemming from FP-supported research. The organisation of major events of relevance for better structuring the ERA in the materials field, with priority to those federating individual events that in the past took place separately, may also be included.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- Consolidation of scattered research and development efforts for a more cohesive, efficient approach to materials advancement, avoiding duplications and gaps;

- Coordination of EU and Member States R&D activities, contributing to strengthening the European Research Area.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 34 – 2014: Networking and sharing of best practices in management of new advanced materials through the eco-design of products, eco-innovation, and product life cycle management

Specific challenge: The production, distribution, use and end-of-life management of materials is associated both with costs and important impacts on the environment, such as consumption of energy, (raw and other) materials and resources consumption, waste generation, emissions and possible generation/management of hazardous substances. It is estimated that approximately 80% of all product-related environmental impacts are determined during the design phase of a product (Aldersgate Group). Eco-design aims at reducing the environmental impact of products, including the energy consumption throughout their entire life cycle.

Scope: Projects should network actors (such as enterprises, academia and research institutions) to:

- share knowledge and practices on eco-design, eco-innovative solutions for manufacturing processes and eco-innovative business models in line with the Commission Communication "Innovation for a sustainable Future – The Eco-Innovation Action Plan" (COM(2011)899), minimise use of material, identify product life cycle scenarios that maximise the number of consecutive cycles of reuse, remanufacturing, or recycling, and/or the time in each cycle, diversify reuse across the value chain, or extend product or component longevity and thus increase advanced material productivity and profitability with final economic benefits for the European industrial economy as a whole; and

- provide models to decouple economic growth from resource constraints. Eco-design principles, recyclability, required materials performance and cost-effectiveness could be part of the study. Life cycle assessment, including cost effectiveness aspects, should be used to justify proposed solutions, where appropriate.

The Commission considers that proposals requesting a contribution from the EU between EUR 1 and 2 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- Better focusing of further Horizon 2020 work programmes targeting the sustainability and competitiveness of European industry through understanding of how improved design principles will reduce consumption of energy and resources, while generating economic growth and creating jobs;

- Contributions to a circular economy approach by fostering product design that facilitates recycling and reuse;

- Contribute to achieving EU policy on Ecodesign, 'Innovation for a sustainable Future - The Eco-innovation Action Plan (Eco-AP)', COM(2011)899.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 35 – 2014: Business models with new supply chains for sustainable customer-driven small series production

Specific challenge: For small series production of, for instance, consumer goods, the traditional supply chains are not suitable. Although internet sales, both B2C and B2B, are fast growing, most of the underlying supply models are still traditional. The change to a faster supply of smaller series and fully personalised products is hampered by the fact that current industrial supply chains are mainly cost-driven, resulting in large series and long lead times. Supply and demand are not in balance. Quality and customer satisfaction are often compromised. Moreover actual production is taking place anywhere in the world and does insufficiently take into account issues of social, environmental and energy sustainability.

Scope: The internet has the potential to support a fully new supply chain model that is fully customer driven. New business solutions should enable consumers to become designers and "customisers"; retailers to become virtual business brokers; manufacturers to produce in a distributed and small scale manner; and suppliers to be more flexible and demand-driven.

Research activities should focus on all of the following areas:
- Integrated business model solutions for customer-driven supply chain management.
- Practical solutions for the ownership, control and management of the related supply chain data
- Novel distributed manufacturing, sourcing and design solutions linking individual "home-based" designers and manufacturers to the supply-chain promoting social inclusion and deploying skills locally available.
- Solutions for local sourcing and supply, thus reducing the environmental footprint.

The projects are expected to include use-case demonstrations aiming at rapid deployment of the novel business solutions in particular consumer-targeted domains. All relevant supply-chain stakeholders are expected to participate.

Activities expected to focus on Technology Readiness Levels 6 – 7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Return of delocalised manufacturing to Europe, in the order of at least 5% of the total manufacturing capacity, in the application area targeted by the project, within 5 years after the end of project;
- Reduction in the environmental footprint compared to products produced in the traditional value chains by 20% through less stock, less waste, and less transportation;
- Creation of a novel supply network involving at least 100 organisations and individuals at the end of the project and 1000 organisations and individuals within 5 years after the end of project;
- Creation of new embedded services supporting the customer-driven supply chain.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 36 – 2014: Facilitating knowledge management, networking and coordination in NMP

Specific challenge: The Horizon 2020 programme for the key enabling technologies of nanotechnology, advanced materials and advanced manufacturing and processing needs to function as a catalyst within the larger European Research Area. To be effective, the programme needs to be supported by a knowledge management system capturing the key performance indicators in industrial policy. EU Member States and Associated Countries should be aware how their research systems for enabling and industrial technologies relate with each other and with Horizon 2020, and support is needed for this coordination.

Another aspect of the networking and coordination involves the ERA-NETs in the field of NMP. ERA-NETs have been set-up in FP6 and FP7 on a wide range of scientific subjects and disciplines relevant to the NMP Programme. While focusing on different scientific areas, they all work towards achieving a common goal of the transnational networking and coordination of national research programmes and address a number of horizontal issues, such as the mapping of existing research potential and foresight activities, the launching of joint calls and addressing the challenges of IPR rules.

Scope: The coordination action should bring together the experience in the various networks to address issues of common interest including synergies with other actors, e.g. ETPs, PPPs and European Regional and Investment Funds; foresight activities; education and training needs; opportunities and strategies for international cooperation; communication and societal dialogue; synergies with Social Sciences and Humanities actors; gender issues; and widening participation.

The project should foresee the inclusion of existing and new ERA-NETs in the NMP area, to prepare and facilitate the future of the ERA-NET instrument and act as a venue for identifying emerging needs and sharing of interests between the national funding agencies, which will eventually lead to joint call definitions under the new instrument.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 500 000 would allow this specific challenge to be addressed appropriately.

Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact:

- Structuring and integration of European Research Area in the field of the key enabling technologies of nanotechnology, advanced materials and advanced manufacturing;
- processing through shared understanding of key performance and coordinated formulation of needs beyond the core Horizon 2020 funding.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 37 – 2014: Practical experience and facilitating combined funding for large-scale RDI initiatives

Specific challenge: Industrial investments into research, technological development and innovation in Europe, in particular with the aim to bridge the valley of death and prepare new manufacturing capacities, will often need a combination of funding instruments, including EU, national and regional funding, making use of structural and regional funds, as well as private financing. The KET High Level Group underlines the need for efficient combination of funding as a key factor for investments into large-scale pilot lines as a crucial step towards commercial exploitation of new developments. New public programmes are being developed and implemented in connection with the next EU multi-annual financial framework including Horizon 2020 and regional and structural funds. While the responsible authorities are committed to make the instruments compatible, industrial stakeholders including SMEs need to understand what this means, how best to use this for their project, and how to combine public support with private financing as needed. They need to satisfy the different requirements in relation to project quality, cooperation arrangements, reporting, risks and other aspects, while also smart specialisation strategies, competition and state aid rules as well as the industrial decision structures need to be respected.

Scope: A coordination action should bring public and private stakeholders together to structure the key questions for the funding of large-scale RDI projects through different funding sources. A number of different though typical cases, should be prepared for concrete investments combining different public and private funding and financing sources, e.g. representing specific KET or preferably cross-KET applications, large and small organisations, larger or smaller consortia etc. While the focus should be on the NMP areas and biotechnologies, the other KETs may also be represented (especially as cross-KETs applications). On this basis practical needs, decision parameters, need for advice and support and best practices will be analysed, covering the entire process of decision making and preparation of actions on the private as well as public side, and taking into account the situation of individual organisations as well as consortia. Overall, the action should help to provide guidance for stakeholders as well as policy makers on the combination of funding instruments and establish recommendations for European policy measures as relevant.

The Commission considers that proposals requesting a contribution from the EU between EUR 500 000 and 1 000 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one proposal will be funded.

Expected impact: Increasing the number of projects using combinations of funding instruments, acceleration of investments into pilot lines and other relevant RDI follow-up

activities towards commercialisation, lessons learned for EU policy making, better definition of public funding instruments in view of their compatibility, improving the awareness and knowledge on funding and financing strategies in industry.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 38 – 2014/2015: Presidency events

Specific challenge: An integral part of the LEIT-NMP part of Horizon 2020 is to organise events of a major strategic nature. Examples are events organised together with successive EU presidencies; and also EuroNanoForum, Manufuture, NMP Conferences and World Manufacturing Forum. The proposed Support Action(s) should contribute to creating better synergy between initiatives launched by the Commission and by the Member States, to the benefit of the coherence of the overall actions within the field of research and innovation within the Industrial Leadership part. Member States which will hold a forthcoming Presidency of the European Union are Latvia and Luxemburg (2015 Presidencies) and they may be particularly interested in this topic.

In order to ensure high political and strategic relevance, the active involvement of the competent National Authority(ies) will be evaluated.

Proposals should address topics of major relevance at the time of the events. An appropriate equilibrium should be present in the proposed action(s), with balanced presentations of various research and industrial elements and points of view. Participation of non-EU actors is possible. Outreach activities may be included, such as a press programme or events dedicated to the wider public or schools.

Scope: The commitment of the national authorities to support the event(s) (from a political point of view, but also with resources) should be a pre-requisite to submit a proposal. The application should be supported by the competent Minister, in a letter added to the application.

The Commission considers that proposals requesting a contribution from the EU between EUR 300 000 and 600 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. No more than one action will be funded for each Presidency (possibly covering more than one event).

Expected impact:

- Review of research, industrial and/or societal developments linked to the Industrial Leadership part areas, as appropriate;
- Sharing of information and comparison of points of views; and
- Networking various stakeholders and supporting their activities, e.g. natural scientists, social scientists, researchers, industrialists, investors, environmentalists, museums and schools.

Type of action: Coordination and Support Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

NMP 39 – 2014: Support for NCPs

Specific challenge: Facilitate trans-national co-operation between NCPs within the Industrial leadership Part with a view to identifying and sharing good practices and raising the general standard of support to programme applicants.

Scope: Support will be given to a consortium of formally nominated NCPs in the area of Leadership in enabling and industrial technologies (Nanotechnologies, Advanced Materials, Advanced manufacturing and processing). The activities will be tailored according to the nature of the theme, and the priorities of the NCPs concerned. Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, training, and twinning schemes. Special attention will be given to helping less experienced NCPs rapidly acquire the know-how accumulated in other countries.

The focus throughout should be on issues specific to the Industrial Leadership part, with the possible inclusion of interdisciplinary approaches, e.g. by involving Social Sciences and Humanities. It should not duplicate actions foreseen in the NCP network for quality standards and horizontal issues under 'Science with and for Society'. *This topic also excludes Biotechnology, as this is covered by the NCPs of Societal Challenge 2*.

The proposal consortium can include only NCPs from EU Member States and Associated Countries, who have been officially appointed by the relevant national authorities. The consortium should have a good representation of experienced and less experienced NCPs.

Submission of a single proposal is encouraged. NCPs from EU Member States or Associated Countries choosing not to participate as a member of the consortium should be identified and the reason explained in the proposal. These NCPs are nevertheless invited and encouraged to participate in the project activities (e.g. workshops).

NCPs from third countries who have been officially appointed by the relevant authorities are also welcome to participate in the project activities.

The costs incurred by the consortium for participation of officially appointed NCPs from EU Member States and Associated countries not participating in the consortium, and from officially appointed NCPs from third countries, e.g. travel costs paid by the consortium, may be included in the estimated budget and be eligible for funding by the Commission.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 500 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of a proposal requesting another amount. No more than one proposal will be funded.

Expected impact:

- An improved and professionalised NCP service across Europe, thereby helping simplify access to Horizon 2020 calls, lowering the entry barriers for newcomers, and raising the average quality of proposals submitted.

- A more consistent level of NCP support services across Europe.

Type of action: Coordination and Support Action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LEIT CALL FOR NANOTECHNOLOGIES, ADVANCED MATERIALS AND KET SUPPORT

H2020-NMP 2014/2015

CONDITIONS FOR THIS CALL

Publication date: 11 December 2013[16]
Opening:[17] 01/03/2014 for phase 1 and phase 2 of the SME instrument
Deadline(s):[18] [19] at 17.00.00 Brussels time on the following dates

Topic identifier	Deadline	Deadline
NMP 1-2014 NMP 4-2014 NMP 5-2014 NMP 8-2014 NMP 9-2014 NMP 27-2014 NMP 31-2014 NMP 33-2014 NMP 34-2014 NMP 36-2014 NMP 37-2014 NMP 38-2014 NMP 39-2014	Single stage 06/05/2014	
NMP 10-2014 NMP 13-2014 NMP 18-2014 NMP 20-2014 NMP 21-2014 NMP 26-2014 NMP 28-2014 NMP 35-2014	First stage 06/05/2014 Second stage 07/10/2014	
NMP 2-2015 NMP 3-2015 NMP 6-2015 NMP 7-2015 NMP 32-2015 NMP 38-2015		Single stage 26/03/2015

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

[17] The Director-General responsible may delay this date by up to two months

[18] The Director-General responsible may delay this deadline by up to two months.

[19] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

NMP 11-2015 NMP 12-2015 NMP 15-2015 NMP 16-2015 NMP 19-2015 NMP 22-2015 NMP 23-2015 NMP 24-2015 NMP 29-2015 NMP 30-2015		First stage 26/03/2015 Second stage 08/09/2015
NMP 17-2014	Single stage 07/10/2014	
NMP 14-2015		Single stage 26/03/2015
NMP 25-2014/2015	Phase 1 Phase 2 18/06/2014 09/10/2014 24/09/2014 17/12/2014 17/12/2014	Phase 1 and Phase 2 18/03/2015 17/06/2015 17/09/2015 16/12/2015

Overall indicative budget: EUR 230.70 million from the 2014 budget[20], and EUR 254.00 million from the 2015 budget[21]

Topic identifier	EUR Million	EUR Million	Selection Procedure
NMP 1-2014 NMP 4-2014 NMP 5-2014 NMP 8-2014	**66.20**		Single-stage
NMP 9-2014 NMP 27-2014 NMP 31-2014 NMP 33-2014 NMP 34-2014 NMP 36-2014 NMP 37-2014 NMP 38-2014 NMP 39-2014	**12.50**		Single-stage
NMP 10-2014 NMP 13-2014	**114.20**		Two-stage

[20] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[21] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

NMP 18-2014 NMP 20-2014 NMP 21-2014 NMP 26-2014 NMP 28-2014 NMP 35-2014			
NMP 2-2015 NMP 3-2015 NMP 6-2015 NMP 7-2015		**66.00**	Single-stage
NMP 32-2015 NMP 38-2015		**2.20**	Single-stage
NMP 11-2015 NMP 12-2015 NMP 15-2015 NMP 16-2015 NMP 19-2015 NMP 22-2015 NMP 23-2015 NMP 24-2015 NMP 29-2015 NMP 30-2015		**152.00**	Two-stage
NMP 17-2015	**16.00**		Single-stage
NMP 14-2015		**10.00**	Single-stage
NMP 25-2014/2015	**21.80** out of which 2.18 for phase 1 19.18 for phase 2 0.44 for mentoring & coaching support and phase 3	**23.80** out of which 2.38 for phase 1 20.94 for phase 2 0.48 for mentoring & coaching support and phase 3	Single stage for both phase 1 and phase 2. The budget available for phase 1 and phase 2 will be divided equally between each cut-off date.

Eligibility and admissibility conditions:

The standard eligibility conditions apply, described in parts B and C of the General Annexes to the Work Programme, with the following exceptions:

Proposals for Research & Innovation and for Innovation Actions should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.
For topics NMP 1, 2, 3, 4, 5, 8, 13, 18, 21, 24, these initial plans may address private funds, or assess synergies and possible cumulative funding with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds related to smart specialisation strategies. For this purpose the tools provided by the Smart Specialization

Platform, Eye@RIS3[22] may be useful.[23] The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

Topic NMP 25-2014/2015:

Proposals for phase 1 are not required to provide a draft plan for exploitation and dissemination.

A proposal for phase 2 shall include a first commercialisation plan.

Evaluation criteria, scoring and threshold:

The standard evaluation criteria apply, described in part H of the General Annexes to the Work Programme, with the following exceptions:

For single-stage and second-stage evaluations, the threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

In case of equal overall scores in the ranked list, the priority order of proposals will be established in accordance with part H of the General Annexes, except that proposals will be ranked on the basis of individual scores for the Impact criterion before the Excellence criterion.

Topics NMP 1, 2, 3, 4, 5, 8:

The evaluation criteria are applied as follows:

1. Excellence

- Clarity and importance of the objectives;
- Soundness of the concept, including trans disciplinary considerations;
- Credibility of the proposed approach;
- Readiness of the technology for implementing the pilot;
- Progress beyond the state of the art in production.

2. Impact[24]

The extent to which the outputs of the project could contribute at the European and/or International level to:

- The expected impacts listed in the work programme under the relevant topic;
- Soundness of the business cases and business plans and commitment to first exploitation / manufacturing;
- Evidence of the market potential and of the competitive technology advantage that will be gained through the pilot line;
- Potential of creating jobs in Europe;

[22] http://s3platform.jrc.ec.europa.eu

[23] The relevant Managing Authorities can be found at http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

[24] The score for the criterion "impact" will be multiplied by 1.5.

- Effectiveness of the proposed measures to communicate the project, and disseminate the project results ,including appropriate management of IPR;
- Contribution, where appropriate, to standards and to skills and educational training.

3. Quality and efficiency of the implementation

- Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources;
- Coverage of the value chain (RTOs, materials, equipment and technology suppliers and end-users);
- Competences, experience and complementarity of the individual participants, as well as of the consortium as a whole;*
- Appropriateness of the management structures and procedures, including risk management.

Operational Capacity (selection criterion)

* As a separate step in the evaluation, expert evaluators must indicate whether the members of the consortium possess at least the minimum competences needed to carry out the proposed work.

Topic NMP 25-2014/2015:

Proposals will be evaluated individually when they arrive. They will be ranked after the respective cut-off dates.

The criterion Impact will be evaluated first, then Excellence and Implementation. If the proposal fails to achieve the threshold for a criterion, the evaluation of the proposal will be stopped.

For phase 1 the threshold for individual criteria will be 4. The overall threshold, applying to the sum of the three individual scores, will be 13.

For phase 2 the threshold for the criterion Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

The final consensus score of a proposal will be the median of the individual scores of the individual evaluators; and the consensus report will comprise a collation of the individual reports, or extracts from them. Where appropriate, a Panel Review will be organised remotely.

Applicants can provide during the electronic proposal submission up to three names of persons that should not act as an evaluator in the evaluation of their proposal for potential competitive reasons[25].

For phase 1, projects shall last 6 months. The duration could be longer in well justified cases.

For phase 2, projects shall last around 12 to 24 months. The duration could be longer in well justified cases.

Evaluation procedure: The full evaluation procedure is described in the relevant guide associated with this call.

[25] If any of the persons identified is an independent expert participating in the evaluation of the proposals for the call in question, they may be excluded from the evaluation of the proposal concerned, as long as it remains possible to have the proposal evaluated.

- Indicative timetable for evaluation and grant agreement[26]:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
	Maximum 5 months from the final date for submission	*Maximum 3 months from the date of informing applicants*
NMP 25-2014/15	Two months after the corresponding cut-off date set out above for phase 1 and four months after the corresponding cut-off date set out above for phase 2.	One month from the date of informing applicants in phase 1 and two months from the date of informing applicants in phase 2.

Consortium agreements: Signature of consortium agreements will be compulsory before the signature of the Grant Agreement for all Research and Innovation and all Innovation Actions.

For the SME instrument (NMP 25-2014/2015), in the case of two or more SMEs submitting a proposal, in line with the Rules for Participation and the Model Grant Agreement, participants are required to conclude a consortium agreement prior to grant agreement.

[26] Should the call publication postponed, the dates in this table should be adjusted accordingly.

Call for Biotechnology

H2020-BIOTEC-2014/2015

Biotechnology has achieved spectacular progress as an enabling technology to drive long term sustainability and growth across economic sectors. Generation of scientific and technological know-how and its translation into industrial products and solutions of societal challenges is paramount in securing European leadership in this key enabling technology, and it is as such at the very core of the current call.

Within the challenge "Biotechnology-based industrial processes driving competitiveness and sustainability" activities are aimed at bridging the gap from lab to market and at creating a path for participants in projects, in particular SMEs and large industries, to continue investing in an array of possibilities for the commercialisation of the knowledge generated. The challenges "Cutting-edge biotechnologies as future innovation driver" and "Innovative and competitive platform technologies" develops generic technological enablers across economic sectors such as health, agriculture and industry. Topics are broad, however with scale and scope, to allow one or several projects with complementary approaches to be financed under the same topic.

Some biotechnology areas such as synthetic biology raise potential ethical and safety concerns. Ethical issues will be embedded in the corresponding topics. Where the biotechnology developments covered by the projects supported by this call would target individuals or groups of people, the gender dimension should be considered.

Cutting-edge biotechnologies as future innovation drivers

This challenge is driven by the vision that cutting edge-biotechnologies are paramount to assure that the European industry is to stay at the front line of innovation, also in the medium and long term. Among cutting-edge biotechnologies, synthetic biology has a high potential to influence, or even transform a range of areas of our economy and society. In terms of supporting tools, progress in bioinformatics is critical to avoid clear-cut limits on the ability to realize the full value of biotechnology. These fields deserve appropriate measures in terms of research and development to facilitate effective transfer and implementation into new applications.

Proposals are invited against the following topics:

BIOTEC 1 – 2014: Synthetic biology – construction of organisms for new products and processes

Specific challenge: Enabling the construction and redesign of biological systems which display novel functions, including functions that are not known in nature, synthetic biology has the potential to transform a range of economic sectors. Applications include, among others, the manufacture of drugs, vaccines and diagnostic agents, the production of fine or bulk chemicals or the detection of pollutants and their breakdown or removal from the environment. While the prospects of combining engineering and biology are enormous, harnessing this potential requires further development of synthetic biology techniques while embedding the notion of responsible innovation upfront in its development.

Scope: Proposals should be industry and application driven, aiming on innovative approaches for different industrially relevant products. RTD challenges relate to the artificial design and/or simplification of the genomes and their use for the predictable engineering of biotechnological applications; the design of robust and sustainable biomolecular circuits and pathways as well as the need to develop standards and creation of orthogonal biological systems. Risk assessment, ethical, societal and intellectual property aspects should be integral part of any project. Proposals should liaise with other on-going FP7 and international activities on responsible governance of the science and society relationship related to synthetic biology. Activities will span between Technology Readiness Levels 3 and 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Scientific breakthroughs spurring innovation across sectors such as healthcare, energy, materials, chemicals, environmental technologies and agriculture.
- Technological validation of a number of synthetic biology derived products currently approaching proof-of-concept phase.
- Reinforced cooperation with academia will allow European industry including SMEs to capitalise on the European knowhow of synthetic biology and keep the prospects for European synthetic biology at the front of global competition.
- Contribution to the educated societal debate on synthetic biology by addressing ethical, safety, and intellectual property aspects.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BIOTEC 2 – 2015: New bioinformatics approaches in service of biotechnology

Specific challenge: One of the greatest challenge facing the biotechnology community today is to be able to make use of the vast and dynamic influx of "omics" data. The synchronised development of bioinformatic concepts and related computational tools for prediction and modelling is a prerequisite to enable the exploitation of this wealth of biological data as a source of new biotechnological applications. These can range from industry and health to the environment and agriculture. Ethical aspects such as those related to confidentiality, sensitive data and data property are relevant to some bioinformatics applications.

Scope: Proposals should develop innovative bioinformatics approaches to close the gap between data availability and the discovery of new biotechnological applications. Proposals should in particular address the needs of SMEs active in the bioinformatics sector and should take into consideration international activities with the objective of fostering global solutions, standards and interoperability. Practical testing for validation of bioinformatics approaches should be considered.

Ethical aspects are to be addressed if relevant to the targeted research. Activities will span between Technology Readiness Levels 3 and 5. Key challenges in this endeavour are:

- Development and/or integration of application-oriented databases taking into account the physical distribution, semantic heterogeneity, co-existence of different computational models and data and, as a consequence, of different interfaces.

- New efficient statistical approaches for increased interpretative and predictive capacity of data, which are taking into account of the molecular complexity of living systems.

- Innovative visualization methods, dedicated to an integrative and synthetic representation of large and heterogeneous datasets involving intuitive tools for visualising and examining data.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Facilitated access, handing and exploitation of existing databases paving the way for new biotechnological applications.

- Bridging existing information from various application areas.

- Accelerated process design and reduced time-to-market enabled by bioinformatics tools such as modelling and prediction.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Biotechnology-based industrial processes driving competitiveness and sustainability

Industrial biotechnology enables industries to deliver novel products which cannot be produced by current industrial methods; in addition it makes possible replacing industrial processes by more resource efficient biotechnological methods with reduced environmental impact. Industrial Biotechnology represents for chemical industry and chemistry-using sectors a unique opportunity for innovation and green growth in an increasingly competitive environment. Current global revenues for goods produced using industrial biotechnology are estimated between EUR 50 billion and EUR 60 billion annually. Predictions for future market values include an estimate that by 2030 the global market for industrial biotechnology could reach EUR 300 billion. This challenge addresses technology driven R&D targeting industrial bottlenecks. The overall aim is to maintain the European leadership in industrial biotechnology.

Proposals are invited against the following topics:

BIOTEC 3 – 2014: Widening industrial application of enzymatic processes

Specific challenge: Biocatalysis is increasingly used in synthetic routes to complex molecules. However, the lack of a broad range of reactions platforms catalysed by enzymes and the long development timelines are hindering the full potential of biocatalysis. As a result, while the industry is in need of sustainable routes for a number of important chemical reactions (e.g. some oxidation, C-C bond formation reactions, etc.) biocatalytic alternatives with reduced

environmental footprint are still not accessible to large scale chemical synthesis and other industrial conversions.

Scope: Development of specific robust biocatalysts for application at a large scale. Attention should be given to oxidoreductases, oxygenases, lyases. Proposals will have a strong industry drive and include demonstration activities to bridge the gap between lab and industrial scale and to assess the technoeconomic viability of the targeted biotransformation. Proposals should address the design and development of generic platform technologies and methods for fast and accurate enzyme activity determination and enzyme optimization enabling the design of highly efficient biocatalysts with an expanded range of substrates and for industrially important conversions. The development of methods for formulation and immobilization of enzymes could be considered with view to optimising process efficiency. Strong weight will be put on industrial leadership of the proposals which are aimed at introducing a real innovation focus. Activities will span between Technology Readiness Levels 5 and 7.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- The demonstration of biocatalytic routes to new chemical reactions at large scale will pave the way for a subsequent market replication. The industrial concepts demonstrated should have the potential for a significant economic, societal and environmental benefit.

- Enhancing industry's capabilities for design of biocatalysts (e.g. rational, computational) and their fast quantitative evaluation with view to ensuring the worldwide leading position of the EU biocatalysis sector.

- Increasing sustainability and competitive-edge of biotech's concomitant sectors such as chemical, pharmaceutical intermediates, fine chemicals, food additives, cosmetics etc.

- Contributing to realising the objectives of industrial and innovation policy, such as the EU Strategy for Key Enabling Technologies.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BIOTEC 4 – 2014: Downstream processes unlocking biotechnological transformations

Specific challenge: A general bottleneck for biotechnological processes is the fact that product concentrations are typically low and it is common that several by-products are produced. These two factors make downstream processing (DSP), isolation and purification having an important impact on the economics of the system causing up to 80% of the production costs. Achieving high efficiency at low costs calls for approaching the design and scale up of the bioprocess and downstream separations as a single integrated process. The development and demonstration of downstream processes is expected to unlock a number of biotechnology transformations that are not economically viable at present.

Scope: The aim is to develop and demonstrate downstream processes which overcome the often low and complex productivity of bioprocesses. This includes tools and technologies such as *in-situ* product removal, separation and purification technologies, newly developed materials (e.g. membranes, adsorbents, resins, etc.), reliable scale-up methods. Demonstration activities should aim at proving the industrial relevance of the developed downstream processes and their integration in the overall biochemical process. Strong weight will be put on industrial leadership of the proposals which are aimed at introducing a real innovation focus. Activities will span between Technology Readiness Levels 5 and 7.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Efficient and integrated downstream processes leading to a tangible reduction of investment and operating costs of the targeted biochemical process.
- Demonstration of downstream processes leading to a significant improvement of the environmental footprint of the targeted biochemical process.
- Contributing to realising the objectives of industrial and innovation policy, such as the EU Strategy for Key Enabling Technologies.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BIOTEC 5 – 2014/2015: SME-boosting biotechnology-based industrial processes driving competitiveness and sustainability

Specific challenge: The large number of SMEs which characterise the EU biotechnology sector are playing a crucial role in the move to competitive and sustainable biotechnology-based processes. These SMEs are characterised by their research intensity and long lead times between early technological development and market introduction. They therefore need to be supported to overcome the so-called "valley of death".

Scope: The SME instrument consists of three separate phases and a coaching and mentoring service for beneficiaries. Participants can apply to phase 1 with a view to applying to phase 2 at a later date, or directly to phase 2.

In phase 1, a feasibility study shall be developed verifying the technological/practical as well as economic viability of an innovation idea/concept with considerable novelty to the industry sector in which it is presented (new products, processes, design, services and technologies or new market applications of existing technologies). The activities could, for example, comprise risk assessment, market study, user involvement, Intellectual Property (IP) management, innovation strategy development, partner search, feasibility of concept and the like to establish a solid high-potential innovation project aligned to the enterprise strategy and with a European dimension. Bottlenecks in the ability to increase profitability of the enterprise through innovation shall be detected and analysed during phase 1 and addressed during phase 2 to increase the return in investment in innovation activities. The proposal should contain an initial business plan based on the proposed idea/concept.

The proposal should give the specifications of the elaborated business plan, which is to be the outcome of the project and the criteria for success.

Funding will be provided in the form of a lump sum of EUR 50 000. Projects should last around 6 months.

In phase 2, innovation projects will be supported that address the specific challenge and that demonstrate high potential in terms of company competitiveness and growth underpinned by a strategic business plan. Activities should focus on innovation activities such as demonstration, testing, prototyping, piloting, scaling-up, miniaturisation, design, market replication and the like aiming to bring an innovation idea (product, process, service etc) to industrial readiness and maturity for market introduction, but may also include some research. For technological innovation a Technology Readiness Levels of 6 or above (or similar for non-technological innovations) are envisaged; please see part G of the General Annexes.

Proposals shall be based on an elaborated business plan either developed through phase 1 or another means. Particular attention must be paid to IP protection and ownership; applicants will have to present convincing measures to ensure the possibility of commercial exploitation ('freedom to operate').

Proposals shall contain a specification for the outcome of the project, including a first commercialisation plan, and criteria for success.

The Commission considers that proposals requesting a contribution from the EU between EUR 0.5 and 2.5 million would allow phase 2 to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should last between 12 and 24 months.

In addition, in phase 3, SMEs can benefit from indirect support measures and services as well as access to the financial facilities supported under Access to Risk Finance of this work programme.

Successful beneficiaries will be offered coaching and mentoring support during phase 1 and phase 2. This service will be accessible via the Enterprise Europe Network and delivered by a dedicated coach through consultation and signposting to the beneficiaries. The coaches will be recruited from a central database managed by the Commission and have all fulfilled stringent criteria with regards to business experience and competencies. Throughout the three phases of the instrument, the Network will complement the coaching support by providing access to its innovation and internationalisation service offering. This could include, for example, depending on the need of the SME, support in identifying growth potential, developing a growth plan and maximising it through internationalisation; strengthening the leadership and management skills of individuals in the senior management team and developing in-house coaching capacity; developing a marketing strategy or raising external finance.

Expected impact:

- Enhancing profitability and growth performance of SMEs by combining and transferring new and existing knowledge into innovative, disruptive and competitive solutions seizing European and global business opportunities.

- Market uptake and distribution of innovations tackling the specific challenge of boosting biotechnology-based industrial processes driving competitiveness and sustainability.

- Increase of private investment in innovation, notably leverage of private co-investor and/or follow-up investments.

- The expected impact should be clearly described in qualitative and quantitative terms (e.g. on turnover, employment, market seize, IP management, sales, return on investment and profit).

Type of action: SME Instrument (70% funding)

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Innovative and competitive platform technologies

Platform technologies are the main tools and techniques shared by nearly all biotechnology applications. Their influence is pervasive, enabling biotechnology applications across economic sectors. Some of them are at the cutting edge, like those developed in the first challenge. Others such as genomics and meta-genomics are already incorporated in the industry toolbox. The challenge aims at furthering technological development of a metagenomics toolbox to expand its potential.

Proposals are invited against the following topic:

BIOTEC 6 – 2015: Metagenomics as innovation driver

Specific challenge: Metagenomics has the potential to provide unprecedented insight into the form and function of heterogeneous communities of microorganisms and their vast biodiversity, without the need for isolation and lab culture of particular organisms. Microbial communities affect human and animal health, support the growth of plants, are critical components of all terrestrial and aquatic ecosystems and can be exploited to produce fuels or chemicals. However, in order to expand their potential further, the metagenomic methodologies need to overcome a number of challenges such as those related mainly to standardisation of experimental design, screening, sequencing technologies and bioinformatics relevant techniques.

Scope: Proposals should address the development of technologies that form the metagenomic toolkit to guide future developments in the field with view to enable metagenomic approaches responding to societal and industrial needs. Similarly, epigenetic modifications and the RNA and protein data (e.g. on cell-cell level) could be addressed to elucidate functional dynamics of communities of microorganisms. Activities will span between Technology Readiness Levels 3 and 5.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Metagenomic methodologies to enabling enhanced understanding of communities of living organisms and empower agricultural, industrial, medical and other applications. This should bring significant and measurable improvements in productivity, yields, quality and functionality, as well as reduction of costs for the end-users.
- Reduced time-to-market thus strengthening competitiveness of European industry and SMEs.

- Identification of, for instance, human drug targets, commercially useful traits in agricultural plants, genes in microorganisms with industrial applications or unravelling pathogens, as well insights into microbial biodiversity for environmental applications.
- Contribution to the standardisation work in the field at European and international level.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LEIT CALL FOR BIOTECHNOLOGY

H2020-BIOTEC-2014/2015

CONDITIONS FOR THIS CALL

Publication date: 11 December 2013[27]
Opening:[28] 01/03/2014 for phase 1 and phase 2 of the SME instrument
Deadline(s): [29] [30] at 17.00.00 Brussels time on the following dates

Topic identifier	2014	2015
BIOTEC 1 – 2014 BIOTEC 3 – 2014 BIOTEC 4 – 2014	First stage 12/03/2014 Second stage 26/06/2014	
BIOTEC 2 – 2015 BIOTEC 6 – 2015		First stage 24/02/2015 Second stage 11/06/2015
BIOTEC 5 – 2014/2015	Phase 1 Phase 2 18/06/2014 09/10/2014 24/09/2014 17/12/2014 17/12/2014	Phase 1 and Phase 2 18/03/2015 17/06/2015 17/09/2015 16/12/2015

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

[28] The Director-General responsible may delay this date by up to two months

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

[30] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

Overall indicative budget: EUR 51.70 million from the 2014 budget[31], and EUR 32.00 million from the 2015 budget[32]

Topic identifier	EUR Million	EUR Million	Selection procedure
BIOTEC 1 – 2014	**18.00**		Two-stage
BIOTEC 3 – 2014 BIOTEC 4 – 2014	**29.90**		Two-stage
BIOTEC 2 – 2015 BIOTEC 6 – 2015		**29.60**	Two-stage
BIOTEC 5 – 2014/2015	**3.80** out of which 0.38 for phase 1 3.34 for phase 2 0.08 for mentoring & coaching support and phase 3	**2.40** out of which 0.24 for phase 1 2.11 for phase 2 0.05 for mentoring & coaching support and phase 3	Single stage for both phase 1 and phase 2. The budget available for phase 1 and phase 2 will be divided equally between each cut-off date.

Eligibility and admissibility conditions:

The standard eligibility conditions apply, described in parts B and C of the General Annexes to the Work Programme, with the following exceptions:

Proposals for Research & Innovation and for Innovation Actions should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.

Topic BIOTEC 5 – 2014/2015:

Proposals for phase 1 are not required to provide a draft plan for exploitation and dissemination.

A proposal for phase 2 shall include a first commercialisation plan.

[31] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[32] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

Evaluation criteria, scoring and threshold:

The standard evaluation criteria apply, described in part H of the General Annexes to the Work Programme, with the following exceptions:

For single-stage and second-stage evaluations, the threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

In case of equal overall scores in the ranked list, the priority order of proposals will be established in accordance with part H of the General Annexes, except that proposals will be ranked on the basis of individual scores for the Impact criterion before the Excellence criterion.

Topic BIOTEC 5 – 2014/2015:

Proposals will be evaluated individually when they arrive. They will be ranked after the respective cut-off dates.

The criterion Impact will be evaluated first, then Excellence and Implementation. If the proposal fails to achieve the threshold for a criterion, the evaluation of the proposal will be stopped.

For phase 1 the threshold for individual criteria will be 4. The overall threshold, applying to the sum of the three individual scores, will be 13.

For phase 2 the threshold for the criterion Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

The final consensus score of a proposal will be the median of the individual scores of the individual evaluators; and the consensus report will comprise a collation of the individual reports, or extracts from them. Where appropriate, a Panel Review will be organised remotely.

Applicants can provide during the electronic proposal submission up to three names of persons that should not act as an evaluator in the evaluation of their proposal for potential competitive reasons[33].

For phase 1, projects shall last 6 months. The duration could be longer in well justified cases.

For phase 2, projects shall last around 12 to 24 months. The duration could be longer in well justified cases.

Evaluation procedure: The full evaluation procedure is described in the relevant guide associated with this call.

- Indicative timetable for evaluation and grant agreement[34]:

[33] If any of the persons identified is an independent expert participating in the evaluation of the proposals for the call in question, they may be excluded from the evaluation of the proposal concerned, as long as it remains possible to have the proposal evaluated.

[34] Should the call publication postponed, the dates in this table should be adjusted accordingly.

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
	Maximum 5 months from the final date for submission	*Maximum 3 months from the date of informing applicants*
BIOTEC 5 – 2014/15	Two months after the corresponding cut-off date set out above for phase 1 and four months after the corresponding cut-off date set out above for phase 2.	One month from the date of informing applicants in phase 1 and two months from the date of informing applicants in phase 2.

Consortium agreements: Signature of consortium agreements will be compulsory before the signature of the Grant Agreement for all Research and Innovation and all Innovation Actions.

For the SME instrument (BIOTEC 5 – 2014/2015), in the case of two or more SMEs submitting a proposal, in line with the Rules for Participation and the Model Grant Agreement, participants are required to conclude a consortium agreement prior to grant agreement.

Call for FoF - Factories of the Future

H2020 – FoF – 2014/2015

Manufacturing is still the driving force of the European economy. Manufacturing activity in Europe provides about **20% of all jobs** (more than 30 million persons) in **25 different industrial sectors** and **over 2 million companies**, 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. The turnover in 2010 was approximately **EUR 6,400 billion** with a value added of more than **EUR 1,500 billion**. 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-sectorial production technologies**.

The *Factories of the Future* Public-Private Partnership (PPP) initiative aims at helping EU manufacturing enterprises, in particular SMEs, to adapt to global competitive pressures by developing the necessary key 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 PPP will concentrate on increasing the technological base of EU manufacturing through the development and integration of the key enabling technologies of the future, such as innovative technologies for adaptable machines, ICT for manufacturing, and the novel industrial handling of advanced materials. ICT plays an essential role in innovating production systems in all sectors. It allows notably for a more personalized, diversified and mass-produced product portfolio and for rapid and flexible reaction to market changes. The initiative will concentrate on industry-led R&D projects and will include demonstration activities, such as production-line demonstrators for validation and market uptake. The partnership will work together to identify the R&D needs of manufacturing industry and in particular SMEs. In order to further ensure the industrial 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-sectorial and including efforts to address the needs of SMEs, aims at transforming Europe into a dynamic and competitive knowledge-based economy.

Proposals are invited against the following topics:

FoF 1 – 2014: Process optimisation of manufacturing assets

Specific challenge: Today's manufacturing is increasingly challenged by uncertainties of continuously and rapidly -changing market conditions and increasingly shorter time-to-market requirements. Manufacturing value chains are distributed and dependent on complex information and material flow requiring new approaches inside and outside the factory both on process and product lifecycle level. They have to respond faster and more efficiently to higher complexity and frequently changing designs. Actions must include validation/demonstration elements and involve stakeholders covering the whole value chain.

Scope:

a. R&I Actions: proposals are expected to cover at least one of the three themes identified below.

CPS-based process optimisation (Cyber-Physical Systems) for adaptive and smart manufacturing systems bringing together novel concepts for CPS, progress in advanced control and new modelling and simulation technologies. The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

- Methods for integrative control and robust optimization of discrete and continuous processes supporting engineers in their aim of detecting, measuring and monitoring the variables, events and situations which affect the performance, energy-use and reliability of manufacturing systems. Research should encompass progress in smart sensor technologies, smart system design, embedded systems, cognitive technologies and advanced control.
- Scalable CPS architectures for adaptive and smart manufacturing systems to dynamically enable the continuous design, configuration, monitoring and maintenance of operational capability, quality, and efficiency. Self-learning closing the feedback loop between production and design should be included as appropriate.

Collaborative and mobile manufacturing: Development of agile collaboration tools for process optimisation of manufacturing assets across the supply chain towards the Cloud-enabled Manufacturing Business Web. Research should address scalable real-time architectures to master complexity and data security of the supply network and underlying logistics resources. In an integrated approach focusing on end-to-end integration of the entire manufacturing processes and the supply networks, research issues to be addressed include: IoT-based continuous data collection from real-world resources, resource virtualisation, real-time, modular architectures for interoperability of intra plant and extra plant processes in conjunction with mobile, collaborative tools for data sharing, data analytics and knowledge-based systems, at factory and at supply network level. The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Towards zero-failure laser-based manufacturing: Fast and accurate process monitoring systems allowing feedback control of laser process parameters in highly dynamic manufacturing processes. Actions should cover in particular the development of (in-line) process monitoring sensors, measurement and non-destructive testing tools including the related high speed data processing and reduction. The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this area to

be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b. Support Actions

Consensus building for a factory-wide interoperability framework for CPS engineering and manufacturing environments; concepts for a European smart specialisation strategy in manufacturing building on the model of virtual value chains; concept and roadmap building in relation to smart and safe workspaces for laser-based manufacturing.

Expected impact:

- Increased capability for better and faster reaction to market changes by being able to use holistic global and local optimization algorithms in a collaborative value chain.
- Reduced complexity of production systems by at least an order of magnitude through an interoperable de-centralised architecture approach and interoperability frameworks.
- Productivity increase of about 30% through the enhanced utilisation of resources and information taking a holistic view in a collaborative value chain.
- Strengthened market position of European producers of laser-based manufacturing equipment, their suppliers and of the users of the equipment.
- Reinforced capacity to manufacture high-quality and innovative products and to penetrate new application areas.

Types of action:

a. Research & Innovation Actions
b. Coordination and Support Actions

FoF 2 – 2014: Manufacturing processes for complex structures and geometries with efficient use of material

Specific challenge: In current market and technological context, mechanical products have to be designed and produced taking into account structural optimisation (which often involves complex structures and geometries) and economically efficient production (i.e. productive and flexible manufacturing). Automated manufacturing of complex geometries, such as additive manufacturing, can be related to issues such as 3D structured, multi-layered and hybrid materials, joining issues or the joint-free realisation of complex shapes. Moreover, newer constraints are coming from requirements of sustainability in production processes (resource and energy efficiency), both through additional regulations and through the increased materials and energy costs. The main aims in the manufacturing of complex structures are quality and productivity with minimum use of material and energy.

Scope: Three complementary approaches can be considered: Innovative resource-efficient manufacturing processes (through tolerance to recycling within manufacturing processes and remanufacturing or through first time right approaches); innovative energy efficient machinery; and developments in process control allowing both to cope with more recycling in the process and to increase output quality (i.e. reduce out-of-tolerance products that have to be refused).

Research activities should address several of the following areas:

- Manufacturing process control and monitoring strategies based on integrated models of both processes and machines, with modules for resource and energy efficiency

planning and monitoring, and with capability of selection of the best process and machine for the part to be manufactured.

- Innovative process concepts and tools, including design supported by computational modelling, for resource efficiency in complex geometries manufacturing.
- Innovative machinery improving resource efficiency from the current state of the art in complex geometries manufacturing.
- Remanufacturing and recycling, with novel or improved use of waste streams.

Activities expected to focus on Technology Readiness Level 4-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Reduction of at least 30% in the material usage pertaining to the manufacturing of complex structures and geometries when compared to current average values.
- Reduction of at least 20% in the overall energy consumption related to the manufacturing of complex structures and geometries when compared to current average values.
- Elimination of faulty manufactured parts by the adequate combination of integrated process-machine approaches with a continuous control of process parameters.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 3 – 2014: Global energy and other resources efficiency in manufacturing enterprises

Specific challenge: The consumption of energy and other resources often represents a major part of the cost of manufactured products. Energy and other resources savings need to be considered at several levels: machine, process, the whole factory and along the entire value chain. The development of new business models focusing on the collaboration of companies operating in the same value chain to increase resources and energy efficiency can bring important cost savings in products and increased competitiveness. Inter-company cooperation can be further facilitated by geographic proximity (Industrial Symbiosis). The ultimate objective is to increase competitiveness of the EU manufacturing sector while at the same time improving environmental performance.

Scope: Research activities should be multi-disciplinary and address all of the following areas:

- Energy and resource consumption data collection along the entire value chain, modelling and integration of data into the decision making tools and procedures.
- Development and implementation of new business models aimed at reducing energy and resource consumption along the whole or a relevant part of the value chain including final users when possible and recycling or reprocessing companies.
- Clustering of factories, suppliers or any other company in order to implement common resources optimization or intelligent demand side management strategies. That may require the development of adapted Manufacturing Execution Systems (MES).

- Development of strategies for enabling energy characterisation of enterprises as a means for obtaining energy certifications coherent with the European Eco-design provisions.
- Development of coherent detailed business cases, including economic, strategic and commercial analysis, of the business models developed during the project.

Projects are expected to use appropriate Life Cycle Assessment and Life Cycle Cost techniques with rigorous baseline values in order to estimate the impact of the results of the project.

Activities expected to focus on Technology Readiness Level 4-6.

This topic is particularly suitable for collaboration at international level, particularly under the IMS scheme.[35] Project partnerships that include independent organisations from IMS regions[36] are therefore encouraged. For a project to get the IMS label it must include independent organisations from at least two different IMS regions.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Energy consumption and CO_2 emission reduction (LCA) for the final product of at least 20% from cradle to gate (use and disposal omitted).
- Energy consumption and CO_2 emission reduction for the product of at least 30% from cradle to grave.
- Product Life Cycle Cost (LCC) reduction of at least 10% from cradle to grave.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 4 – 2014: Developing smart factories that are attractive to workers

Specific challenge: In a very competitive environment, manufacturing enterprises will need to be attractive to potential workers. This will require new thinking both on scheduling of work and design of attractive and safe workplaces, taking into account the ageing workforce. The aim is to demonstrate the operation of a real smart factory, focusing on the interconnection between organisation, workforce, management and technology. This interconnection must be supported by new models for optimisation and utilisation of production systems to ensure efficient transfer of knowledge and information. This requires new ways of using new technologies (e.g. augmented reality), which are highly adaptable and able to address the task holistically. The new models must be able to support the workers' tacit knowledge in the

[35] IMS (Intelligent Manufacturing Systems) is an industry-led, global, collaborative research and development programme, started in 1995 as the world's only multilateral collaborative R&D framework: www.ims.org

[36] The current member regions of IMS are the European Union, the United States of America, Mexico and the EFTA state of Norway.

process of both controlling the production line and controlling advanced machinery. This will enhance synergy in the interaction between humans, technology and the organisation.

Scope: Demonstration activities should be multi-disciplinary, involving in particular as appropriate disciplines of Social Sciences and Humanities, and address all of the following areas:

- Methodologies and tools for efficient design or re-adaptation of production facilities based on co-evolving product-process-production systems considering simultaneously productivity aspects and the wellbeing and autonomy of the workers, through the integration of technologies.
- New methods and technologies for an optimised take-up and use of workers' knowledge, to stimulate team interactions and to enhance work related satisfaction taking into consideration safety and ergonomics of the working areas.
- Integration of innovative production technologies supporting increased productivity and flexibility.
- Incorporating aspects linked to education, workers' training and attractiveness to the young and the elderly (e.g. in-factory teaching, 'factory-lab' concepts).

Attractive research will support manufacturing enterprises in Europe in their respective efforts for talents to be employed in attractive manufacturing jobs. Proof of concept in terms of at least one industrial pilot demonstrator should be delivered before the end of the project, convincingly demonstrating a solution to industrial needs.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

This topic is particularly suitable for collaboration at international level, particularly under the IMS scheme.[37] Project partnerships that include independent organisations from at least three IMS regions[38] are therefore encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- In social terms, an improvement in the working conditions in factories and in the

[37] IMS (Intelligent Manufacturing Systems) is an industry-led, global, collaborative research and development programme, started in 1995 as the world's only multilateral collaborative R&D framework: www.ims.org

[38] The current member regions of IMS are the European Union, the United States of America, Korea, Mexico and the EFTA state of Norway.

attractiveness of the working environments in particular for young people.

- Improved work satisfaction of employees within the factories of the future.
- In economic terms, an increase of 10% in productivity due to an increased commitment of people, better organisation of work and by increasing the pool of potential workers through widening the skill profile.
- Strengthened global position of European manufacturing industry through the introduction of the new technologies.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 5 – 2014: Innovative product-service design using manufacturing intelligence

Specific challenge: Manufacturing intelligence requires a high integration of (ICT-based) engineering tools and secure middleware solutions that facilitate easy, ubiquitous (e.g. Cloud-enabled) and fast sharing of product and process information/knowledge across the entire lifecycle and among all actors involved. Today's ever faster product lifecycles and ever higher quality requirements necessitate manufacturing engineering capability and knowledge that is able to exploit to the maximum the concurrency of product and service engineering with immediate, cross-disciplinary feedback loops to relevant shop floor knowledge. Also end-users feedback and requirements should be taken into account.

Scope: Research should aim at developing open, multi-disciplinary and holistic product-service engineering environments with the following features:

- Collaborative management of engineering knowledge and its multi-directional exchange between product design, service design and manufacturing, enabled by rapid search for design functionality and reusability.
- Tools and methodologies to effectively involve customers, suppliers and other relevant organisations across the value chain.
- Multi-disciplinary search, simulation and optimisation (e.g. including modularity and reusability as optimisation parameters) of designs and innovative visualisation tools involving intuitive tools.
- Quantification of overall (time-to-market) improvements and reduction of the lifecycle CO_2 footprint of new products.

Activities expected to focus on Technology Readiness Level 4-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Improved time-to-market for European manufacturers.
- Improved sustainability across the entire product-service lifecycle.
- Improved knowledge sharing across product design, manufacturing and product-service lifecycle.

- New and better product-service offerings addressing customer needs.

- Increased support for open standards targeting security and interoperability of shared engineering data.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 6 – 2014: Symbiotic human-robot collaborations for safe and dynamic multimodal manufacturing systems

Specific challenge: Immersive and symbiotic collaboration between human workers and robots is a key element to be addressed for the further automation of tasks and processes in the European manufacturing industry. It offers a solution leading to higher profitability to robot-reluctant industries where current tasks and processes are too complex to be automated. Currently novel methods for human-robot interaction have been proven in structured non-industrial environments. In order to enhance the introduction of robots on the shop floor in a real industrial setting, several important human and organisational issues, such as safety and difficult working environments, have to be dealt with.

In particular, future human-robot-systems will have to be dynamic and cost-effective, act safely in a shared fenceless working space and allow for the development of specific competences and skills for workers in their interactions with robots.

Scope: While the focus will be on demonstrating the multimodal manufacturing systems (e.g. systems combining visual, auditory and haptic interfaces), R&D activities supporting integration and scale-up are also expected.

Two key obstacles to overcome to facilitate the introduction of robots on the shop floor of robot resistant production plants are the safety of the worker and the symbiotic collaboration.

Demonstration activities should focus on at least two topics of each of the two areas:

- Safety of the worker:
    - Innovative strategies for online safety monitoring such as the interactive perception of the whole workspace as well as directed perception focused on the task.
    - Development of intrinsically safe robot hardware on industrial scale leading to high power robots which are both safe and precise.
    - Safety during a mechanical failure of the robotic system during tight collaboration of humans and robots.
- Human-Robot interaction:
    - Intuitive and multimodal programming to allow robot systems to be rapidly and easily programmed without prior knowledge on robot systems, while still allowing for a cost-efficient deployment of the robotic system in an industrial setting.
    - New methodologies for the initial planning and online dynamic replanning of the shared tasks, taking into account the organisation contexts of the addressed industrial sectors.

- New innovative, fast and cost-effective sensors for detection in combination with the application of innovative strategies to analyse real-time large amounts of sensor data.

In close interaction with the research activities, relevant certification issues should be addressed. In order to allow a wide use of the newly developed robotic system in new production areas and sectors, a clear case for maintaining reduced investment costs has to be made, including a return-on-investment study.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capabilities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Industrial-scale demonstrator of safe human-robot tight collaboration by sharing workspace and tasks, paving the way for potential improvements of the normative aspects.

- Increasing use of robot installation in traditional European robot-reluctant industries. In particular SMEs, manufacturing plants with highly manual processes and continuous production lines. Further improvement in robotics solutions deployment will contribute to higher employment as more manufacturing capacity will remain in Europe.

- Increasing industrial-readiness and adaptability of human-robot collaborating manufacturing systems by increasing the robustness of those systems for noisy and extreme industrial environments and by combining the flexibility inherent to humans with the enhanced potential of cooperative production systems.

- Improved cost-efficiency through the use of symbiotic human-robot approaches.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 7 – 2014: Support for the enhancement of the impact of FoF PPP projects

Specific challenge: Dissemination, exploitation and transfer of projects results are crucial activities during project life-time and beyond in order to make sure that projects have the expected impacts. Clustering of project activities, according to objectives and addressed themes, and their inter-linking with existing technology transfer activities, are effective ways to stimulate the take-up of project results and to exploit synergies. An adequate monitoring of such activities during the project life-time and beyond is also needed, to ensure an effective implementation at programme level.

Scope: The coordination actions shall aim in particular to actively cluster existing activities under the FoF PPP. The initiative, which is expected to last 2 years, will require close collaboration with relevant industrial associations and technology transfer programmes.

Activities may include:

- Reviews of recent technological developments, publications, international RTD and innovation programmes within the technological area of the cluster
- Workshops with top-ranked international experts from various disciplines aiming at the elaboration of future FoF priorities within the technological area of the cluster.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 300 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Speeding up industrial exploitation and take up of results of FoF PPP projects.
- Stimulation of networks and alliances for further RTD and industrial innovation in the addressed technology and application areas, including the development and practical application of a clustering model.
- Added value beyond the original scope of the FoF PPP projects by exploiting synergies and sharing best practice. Increased public presence and awareness of FoF PPP activities.
- More effective execution of activities of common interest, such as IPR management and standardisation.
- Anticipation of business trends and market prospects.

Type of action: Coordination and Support Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 8 – 2015: ICT-enabled modelling, simulation, analytics and forecasting technologies

Specific challenge: Simulating continuous and discrete manufacturing processes, forecasting the behaviour of manufacturing systems and processes, and designing products to an even larger extent through virtual mock-ups and optimization methods integrated in the design and production chain are key enablers for Europe's future manufacturing sector. Advances in ICT in terms of high performance computing power and communication speed, smart sensor technologies for generating and exploiting "big data", the convergence of the embedded world and the Internet/Cloud world in cyber physical systems (CPS), multi-modal visualisation and interaction technologies, are leading to a new generation of modelling, simulation, forecasting and decision support methods and tools. These offer a huge potential for making the whole manufacturing chain more competitive.

Scope:

a. R&I Actions: proposals are expected to cover at least one of the two themes identified below.

Innovative modelling, simulation, analytics and forecasting tools for manufacturing at large, building on advances in ICT. The Commission considers that proposals requesting a contribution from the EU between EUR 2 and 4 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects should be driven by industrial use-cases and should include proof-of-concept demonstrations for validation, preferably on real process chains. They should address as appropriate several of the following issues:

- Modelling and simulation methods involving multiple phenomena (physical, mechanical, energetic, chemical, energy, material characteristics, cost, …); including multi-scale and integrated discrete/continuous models, multidisciplinary and multiobjective design optimisation tools taking a holistic approach; and/or integrating virtual and physical experiments building on the combination of simulated, experimental, and real world data in real time.
- Integrated knowledge-based systems covering the complete product life-cycle with advanced analytics, smart decision support systems and self-learning capabilities exploiting the availability of "big data" from smart sensors, historical process files, or human-authored data; and addressing aspects, e. g. interactivity, real-time, data-fusion, imprecise computing, compressed sensing, advanced visualisation, security and privacy.

Integrated modelling, simulation and information management systems benefiting from recent advances in ICT. The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this area to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Projects are expected to stimulate pre-normative or standardisation activities related to aspects such as information/knowledge exchange, data sharing, semantic technologies, tool integration, etc. Projects must include reference implementations and demonstration and validation in minimum two comprehensive and complementary industrial use cases. Focus is on:

- Integrated information management systems for product-process-production systems that are well embedded into their social, environmental and economic context.

- Advanced computer aided technologies (CAx), modelling, simulation and decision support toolboxes tailored for novel manufacturing processes, e. g. laser-based and additive manufacturing.

b. Support Actions: Road mapping and constituency building for novel ICT-enabled concepts in manufacturing supporting the wide adoption of virtual, integrated, scalable, semantic factory models; merging design and production models; and integrating novel ICT for creativity. Stimulating EU-US collaboration on R&I related to modelling and simulation.

Expected impact:

- Increased productivity during design and ramp-up phases and for higher mass customization capacity for big enterprises as well as SMEs through access to on-demand scalable manufacturing process chains and services and through agreed data standards.
- Improved cost efficiency and accuracy, reliability and speed of simulation techniques for manufacturing processes and/or full complex products.
- Reduced time to production and optimised supply chains enabled by increased tool interoperability and data integration.
- Enhanced interoperability of integrated product and factory design systems and global state monitoring enabling new type of services related to the data analysis, simulations and visualization techniques in each manufacturing stage.

Types of action:

a. Research & Innovation Actions
b. Coordination and Support Actions

FoF 9 – 2015: ICT Innovation for Manufacturing SMEs (I4MS)

Specific challenge: For Europe's competitiveness in manufacturing, it is crucial that advances in ICT are taken up in engineering and manufacturing "at large" as soon as they have the appropriate maturity level.

Scope: As Phase 2[39] of I4MS this objective addresses the adoption of the next generation of ICT advances in the manufacturing domain. Focus is on emerging innovative technologies and processes, which need to be customised, integrated, tested and validated before being released on the market. Special emphasis is on strengthening European SMEs along the value chain by adopting new concepts and business models based on servitisation, for product operation, or for end-of-life use.

Two types of **innovation experiments** are supported: Driven by the requirements of first-time users, **Application Experiments** bring together all actors of the value chain and experts necessary to equip new users with novel products or services and assist them in customising and applying these in their respective environments. In **Equipment Assessment Experiments,** suppliers of innovative high-tech equipment install and assess their prototypes or products in production-like environments and validate them in a manufacturing line or in an industrial environment that is very close to manufacturing conditions.

[39] Information of Phase 1 available in http://cordis.europa.eu/fp7/ict/computing/home-i4ms_en.html

Activities are expected to be clustered in larger projects to achieve critical mass and to better exploit EU-added value. Common tasks include: targeted dissemination; management of calls for new actions; exploitation of synergies across actions.

The action may involve financial support to third parties, in line with the conditions set out in part K of the General Annexes. The consortium will define the selection process of additional users and suppliers running the experiments for which financial support will be granted (typically in the order of EUR 50 000 – 150 000[40] per party). Maximum 50% of the EU funding should be allocated to this purpose.

a. Three areas of technologies are targeted for the **Innovation actions**::
- Highly flexible and near-autonomous robotics systems (application experiments).
- HPC Cloud-based modelling, simulation and analytics services for modelling multiple interconnected phenomena; for integrating multiple tools across the process chain; for exploiting the dynamic availability of "big data"; for integrating novel mobile interfaces for data management and decision support; for achieving real-time response (application experiments), and addressing comprehensively security and privacy issues at all levels.
- Integration of Cyber-Physical-System modules in manufacturing processes and process chains (application or assessment experiments) to increase sophistication and automation in production SMEs and to create novel value added services linked to process surveillance and maintenance.

b. **Support actions**: network of Innovation multipliers leveraging investment in research and innovation is to be reinforced:

To advance the European I4MS **innovation ecosystem**: The aim is to achieve broad coverage in technological, application, innovation, and geographic terms. Its tasks and services shall include maintaining a single innovation portal for newcomers; sharing of best practices and experiences; dissemination; brokering between users and suppliers in view of open calls; leveraging further investment by stimulating replication, by brokering access to venture capital or other private investment, and by exploiting regional funds in the context of the European strategy on "Smart Specialisation".

Expected impact:

- Attract a significant number of new users of **advanced ICT** in the **manufacturing sector**, in particular SMEs and the mid-caps.
- More **innovative and competitive technology suppliers**, in particular SMEs, both on the level of ICT and on the level of manufacturing equipment, able to supply manufacturers with new equipment, components, and tools for improved manufacturing and engineering operations.
- More competitive **European service providers** through provisioning of new types of services; through strengthening the presence on local markets.
- Exploration of new application areas for advanced ICT in manufacturing at large.

Types of action:

a. Innovation Actions The Commission considers that proposals requesting a contribution from the EU between EUR 5 and 8 million would allow this area to be addressed

[40] In line with the Rules for Participation Article 19 (7) the amounts referred to in Article 137 of the Financial Regulation may be exceeded where it is necessary to achieve the objectives of the action.

appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

b. Coordination and Support Actions

FoF 10 – 2015: Manufacturing of custom made parts for personalised products

Specific challenge: The manufacturing of customised products (e.g. consumer goods and medical devices) requires the development of new strategies integrating design with manufacturing and incorporating appropriate control methodologies to ensure small or large lot quantities which meet the specifications. Examples include new custom made parts or spare parts on demand either to sub-divisions of sectors/products or personalised to an individual as well as unique identification marking of products. New manufacturing processes and machines will need to be developed which are flexible at the local level to meet specific consumer demand and mass customisation where rapid translation between different specifications is required. In order to address customisation, advanced manufacturing processes(e.g. additive manufacturing or electrical discharge machining) need to enable processing of multi-materials, lightweight and high-strength materials or functionally graded materials, as well as more flexibility and rapid reconfiguring capabilities. For all customised manufacturing, it is necessary to have quick realisation from design to production in one process step as well as economic production systems down to single and small lot sizes.

Scope: Research activities should be multi-disciplinary and address several of the following areas:

- Development and integration of advanced design and manufacturing technologies able to transform such new product-service data descriptions and protocols into manufacturing operations and processes exploiting.
- Development of new machines and processes integrating advanced materials for the manufacturing of personalised parts and products.
- Seamless data integration across the process and supply chains for the fast production and distribution of custom made parts and products.
- Methodologies and tools for the management and running of effective value chains for the fast production and delivery of personalised products.

Activities expected to focus on Technology Readiness Level 4-6. A significant participation of SMEs with R&D capabilities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Increased capability to provide value added products/services and to rapidly follow the market dynamics by means of fast production and delivery of customised parts and products.
- Reduction by 50% in the lead-time for manufacturing one new custom part with respect to current values for same requirements.
- Cost reduction of personalised products manufacturing by 20%, by decreasing lead times in products and processes development and the time to market of customised parts and products by 30%.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 11 – 2015: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots

Specific challenge: Easy and fast reconfigurable machinery and robots are essential to answer to the increasing need for highly complex products and to react to rapid changes in market demands. Smaller lot sizes and more product variations require a highly flexible production capacity. New tools are required to support more rapid and autonomous reconfiguration of production systems. Powerful tools addressing self-adjustment, correction, and control of individual machines and robots, the production system as a whole and the link with existing production planning and scheduling systems have been developed over recent years but integration and deployment of those tools require further R&D and demonstration. While the focus will be on demonstrating the tools on existing production capacity, R&D activities supporting the integration and scale-up are expected as well.

Scope: Demonstration activities should address all of the following areas:

- Integrated tools for the management of agile production systems as a whole (Manufacturing Execution Systems) and the fast reconfigurable individual machines and robots, optimising the changeover times and costs.
- Standardisation of the communication protocols and data structures fitting the plug and produce philosophy.
- Protocols for interconnecting the production system information with higher level plant management systems.
- Integration of automatic monitoring and optimisation of energy usage in the production system.
- Demonstration of the integrated solution in at least one existing production environment.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capabilities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Enabling existing production systems to produce on average at least 50% smaller lot sizes and 50% more product variations in an economical way, as a result production will be demand driven and waste will be significantly reduced.

- Reduction of at least 30% of the set-up and changeover times and costs for existing production systems leading to a significant increase in production capacity.

- Reduction of average energy consumption by 5% through an optimised use of production capacity.

- Strong support for standardisation of communication protocols, data structures and tool connectivity.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 12 – 2015: Industrial technologies for advanced joining and assembly processes of multi-materials

Specific challenge: Multi-material design of components and structures provides an opportunity to develop products which are able to operate under more exigent requests demanded by market and society such as increased strength-to-weight ratio, multi-functionality, highly aggressive environments and low carbon footprint. By smart use of adequate joining technologies, and the incorporation of multi-material design into the assembly chain, the final product performance can be improved. This is particularly relevant when high cost, scarce or hazardous materials are involved.

Scope: Traditional joining leads to loss of the performance that materials offer in their final product, because of modifications in composition and properties or geometric distortion. Improved, new or hybrid joining and assembly processes are therefore needed to be developed for specific combinations of designs and materials, in combination with flexible and automated non-destructive inspection technologies, in order to overcome the mentioned limitations. Technologies to be addressed can be welding processes, bonding using adhesives, mechanical joining or any other joining process. The novel joining integration capabilities will feature a high degree of process automation and quality control and they will make use of sustainable manufacturing practises. Assembly and disassembly efficiency, product quality, recycling and cost targets will also be considered. While the focus will be on demonstrating the technologies, R&D activities supporting the integration and scale-up are expected as well.

Demonstration activities should focus on all of the following priorities:

- Joining and assembly processes that will lead to maximise performance of the joints and/or to facilitate recycling, based on a deep understanding of the cause-effect relationships as well as of materials process interactions.
- The implementation of numerical simulation techniques, including computational multi-scale modelling, which will lead to a better understanding of the considered joining processes as well as product development along all its different phases.
- The development of high efficient, cost-effective and flexible surface condition solutions (e.g. surface modification, thermal treatments, gap avoidance) to provide joints with the maximum performance.
- The implementation and set up of reliable, efficient and automated non-destructive inspection techniques for joint quality evaluation, together with in-situ monitoring and control systems for critical variables of the joining operations that will guarantee reliable, robust and safe production conditions in industrial environments.

At least one prototype or pilot implementation in pre-industrial settings aiming at demonstrating the scalability should be delivered before the end of the project as a proof of concept.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capabilities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

Application of multi-material design to products through the developed joining and assembly processes will bring:

- At least 20% decrease in the consumption of high cost and critical materials.
- At least 30% improvement of the product performance, without increasing the final price.
- A higher level of automation and lower production times compared to current technologies.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 13 – 2015: Re-use and re-manufacturing technologies and equipment for sustainable product lifecycle management

Specific challenge: In order to increase the competitiveness of EU industry and reduce the environmental footprint, manufacturing industries should develop innovative technologies and approaches to manufacture added-value products with fewer resources and to ensure a sustainable product life cycle based on reuse and re-manufacturing methods and technologies.

Innovative product recovery approaches would need to be developed in order to extract useful components from obsolete or malfunctioning modules, to re-use useful functions and/or materials for new products or to extend their lifespan. This will help save time, money, energy, and resources.

Modern high-tech products adopted in the electronics, medical and energy industries are made of advanced materials that are at present poorly recovered and reused. Such materials with low substitutability and low recycling rates include advanced materials such as long and short fibre composites, nano-materials and bio-materials as well as more conventional materials that are today not considered for re-use due to absence of data on reprocessed performance.

This unsustainable scenario requires systemic solutions which are involving all relevant actors in the supply chain. On the one side, there is the need for new product design approaches

(including end-of-life options, re-use and re-manufacturing aspects) with development of the built-in product 'smartness' (for ageing monitoring) and modularity (for improved reuse). On the other side, new re-/de-manufacturing processes with improved resource efficiency, or processes more tolerant to substitute materials are required.

Scope: Research activities should be multi-disciplinary and address all of the following areas:

- Eco-innovative approaches for product design which are capable to take into account re-use and re-manufacturing aspects for enhanced product recovery and spare parts/services support.
- New manufacturing and equipment concepts for re-use and re-manufacturing, with improved resource efficiency and service lifetime.
- New technologies and automation solutions for the effective disassembly/separation and recovery of advanced materials.
- Generation and validation of new business models to improve economic viability of closed-loop life cycles which make use of the systemic approaches for product life-cycle management.

Activities expected to focus on Technology Readiness Levels 4-6.

This topic is particularly suitable for collaboration at international level, particularly under the IMS scheme.[41] Project partnerships that include independent organisations from IMS regions[42] are therefore encouraged. For a project to get the IMS label it must include independent organisations from at least two different IMS regions.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- A significant reduction of energy consumption in manufacturing activities by 2020.
- A significant reduction in non-renewable materials through a combination of substitution, reuse, remanufacture and recycling of materials.
- Reduction of minimum 20% in greenhouse gases emissions from manufacturing activities.
- Reduction of waste generation by 10% minimum.
- Enabling the manufacturing of eco-products.
- Increase of above 20% in productivity rates.
- Clear illustration of possibilities for new safe and sustainable jobs creation.

Type of action: Research & Innovation Actions

[41] IMS (Intelligent Manufacturing Systems) is an industry-led, global, collaborative research and development programme, started in 1995 as the world's only multilateral collaborative R&D framework: www.ims.org

[42] The current member regions of IMS are the European Union, the United States of America, Mexico and the EFTA state of Norway.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

FoF 14 – 2015: Integrated design and management of production machinery and processes

Specific challenge: Production quality significantly depends on the ambient conditions and the process parameters. Computational models capable of simulating the machine-to-part process not only can be used to predict manufacturing quality and productivity but, increasingly, to also compensate wear or partial damage through model-based control. Innovative machines and processes increasingly depend on model-based approaches, including the monitoring and control elements, throughout the whole machine lifecycle.

New integrated approaches are needed in simulation methods, tools and across hierarchical model layers requiring a cross-disciplinary collaboration between (predominantly SME) machine designers, industrial component suppliers, engineering software developers as well as making use of the process experience of manufacturers.

Scope: RTD and innovation activities should aim at developing and testing suitable model-based approaches for production machinery and at demonstrating the power of model-driven approaches for machine innovation through:

- The development of integrated and accurate simulation models and algorithms for model-based control of production machinery based on cross-disciplinary input and actual machine lifecycle parameters.
- Tool programming strategies that are easy to use and can be rapidly modified or re-adapted by workers on the machine.
- Demonstration of the reliability of model-based machines with respect to production accuracy/quality, maintainability and lifecycle return-on-investment (e.g. through an industrially scalable demonstrator).

Activities expected to focus on Technology Readiness Levels 4-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Improved system adaptability and reduction of lifecycle costs by 30% for manufacturing system and process.
- New maintainability concepts based on predictive "(self-) maintenance" with machine reliability improved by 10% (MTBF) and reduced maintenance costs by 20%.
- In terms of environmental impact: Reduced waste and energy efficiency improved by 30%.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LEIT CALL FOR FOF – FACTORIES OF THE FUTURE

H2020-FoF-2014/2015

CONDITIONS FOR THIS CALL

Publication date: 11 December 2013[43]
Deadline(s): [44] [45] at 17.00.00 Brussels time on the following dates

Topic identifier	Deadline
FoF 1-2014 FoF 2-2014 FoF 3-2014 FoF 4-2014 FoF 5-2014 FoF 6-2014 FoF 7-2014	20/03/2014
FoF 8-2015 FoF 9-2015 FoF 10-2015 FoF 11-2015 FoF 12-2015 FoF 13-2015 FoF 14-2015	09/12/2014

Overall indicative budget: EUR 116.00 million from the 2014 budget,[46] of which EUR 34.00 million from the LEIT-ICT part and 82.00 EUR million from the LEIT-NMP+B part; and EUR 145.00 million from the 2015 budget,[47] of which EUR 68.00 million from the LEIT-ICT part and 77.00 EUR million from the LEIT-NMP+B part.

All single-stage	2014	2015
Topic identifier	EUR Million	EUR Million
FoF 1.a-2014	32.00	
FoF 1.b-2014	2.00	

[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 deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

[46] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[47] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

FoF 2-2014 FoF 3-2014 FoF 4-2014 FoF 5-2014 FoF 6-2014 FoF 7-2014	**82.00**	
FoF 8.a-2015		31.00
FoF 8.b-2015		1.00
FoF 9.a-2015		35.00
FoF 9.b-2015		1.00
FoF 10-2015 FoF 11-2015 FoF 12-2015 FoF 13-2015 FoF 14-2015		**77.00**

Eligibility and admissibility conditions:

The standard eligibility conditions apply, described in parts B and C of the General Annexes to the Work Programme, with the following exceptions.

Proposals for Research & Innovation and for Innovation Actions should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.
For topics FoF 4, 6, 11, 12, these initial plans may address private funds, or assess synergies and possible cumulative funding with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds related to smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3[48] may be useful.[49] The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

Evaluation criteria:

The standard evaluation criteria apply, described in part H of the General Annexes to the Work Programme, with the following exceptions:

The threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

In case of equal overall scores in the ranked list, the priority order of proposals will be established in accordance with part H of the General Annexes, except that proposals will be ranked on the basis of individual scores for the Impact criterion before the Excellence criterion.

[48] http://s3platform.jrc.ec.europa.eu

[49] The relevant Managing Authorities can be found at
http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

Topics FoF 6, 11, 12:

The evaluation criteria are applied as follows:

1. Excellence

- Clarity and importance of the objectives;
- Soundness of the concept, including trans disciplinary considerations;
- Credibility of the proposed approach;
- Readiness of the technology for implementing the pilot;
- Progress beyond the state of the art in production.

2. Impact[50]

The extent to which the outputs of the project could contribute at the European and/or International level to:

- The expected impacts listed in the work programme under the relevant topic;
- Soundness of the business cases and business plans and commitment to first exploitation / manufacturing;
- Evidence of the market potential and of the competitive technology advantage that will be gained through the pilot line;
- Potential of creating jobs in Europe;
- Effectiveness of the proposed measures to communicate the project, and disseminate the project results ,including appropriate management of IPR;
- Contribution, where appropriate, to standards and to skills and educational training.

3. Quality and efficiency of the implementation

- Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources;
- Coverage of the value chain (RTOs, materials, equipment and technology suppliers and end-users);
- Competences, experience and complementarity of the individual participants, as well as of the consortium as a whole;*
- Appropriateness of the management structures and procedures, including risk management.

Operational Capacity (selection criterion)

* As a separate step in the evaluation, expert evaluators must indicate whether the members of the consortium possess at least the minimum competences needed to carry out the proposed work.

Evaluation procedure: The full evaluation procedure is described in the relevant guide associated with this call.

- Indicative timetable for evaluation and grant agreement[51]:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements

[50] The score for the criterion "impact" will be multiplied by 1.5.

[51] Should the call publication postponed, the dates in this table should be adjusted accordingly.

	Maximum 5 months from the final date for submission	*Maximum 3 months from the date of informing applicants*

Consortium agreements: Signature of consortium agreements will be compulsory before the signature of the Grant Agreement for all Research and Innovation and all Innovation Actions.

Call for EeB – Energy-efficient Buildings

H2020 – EeB – 2014/2015

Worth at least 1.3 trillion Euros of yearly turnover (2010), the **European construction sector** and its extended value chain (e.g. material and equipment manufacturers, construction and service companies) is the **largest European single activity** (9.6% GDP) and industrial employer (30.7% of industrial employment). Furthermore the built environment affects the life and work of all EU-citizens: The construction sector also has a crucial impact on the EU environment and energy policies as buildings use **40% of total EU energy consumption** and **generate 36% of Green-House Gases** in Europe while the replacement rate of the existing stock is very small (1-2% per year).

The construction sector is on the critical path to decarbonise the European economy by 2050. In order to achieve this objective it must enable reducing its CO2 emissions by 90% and its energy consumption by as much as 50%. This is a unique opportunity for sustainable business growth provided that products and related services for both new and refurbished buildings are affordable and of durable quality, in line with several current or future European Directives. Yet, together with the 2050 deadlines, such Directives are putting more constraints on a sector which is directly impacted by the on-going financial and economic crisis, taking into account that, although Europe has major companies, **this sector is highly fragmented with over 95% of SMEs**.

The objective of the *Energy-efficient Buildings* Public-Private Partnership (PPP) Initiative is to drive the creation of a high-tech building industry which turns energy efficiency into a sustainable business, fostering EU competitiveness in the construction sector on a global level.

This call will complement the call on Energy Efficiency of the Energy societal challenge, by helping 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 technologies, materials and components for energy saving and energy generation, thermal energy storage systems, advanced insulation systems, thermal distribution systems, lighting, windows and glazing, energy generation systems based on renewable sources. Priorities also include reliable simulation and prediction tools, including assessment methods that integrate economic, 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 and such integration should also be promoted.

Activities supported under the EeB PPP are expected to contribute to EU industrial leadership and the grand societal challenges.

The participation of public authorities may be an asset for some projects, as public authorities own a large part of the building stock at European level.

Proposals are invited against the following topics:

EeB 1 – 2014: Materials for building envelope

Specific challenge: When improving the level of energy performance of buildings in operation, embodied energy in materials presents an increasingly high percentage of the energy spent in the whole life cycle of a building. The same applies for CO_2. Therefore, the development of new sustainable construction materials with lower embodied energy and lower CO_2 emissions is needed. New approaches in material science and production technologies will help to minimize the embodied energy of the main construction materials such as concrete, glass, gypsum, ceramics or steel, involved in the structure, envelope and other building components of energy efficient buildings. At the same time, components with improved insulation and air tightness properties (which are influenced by construction tolerances) are needed, aiming at the overall target of reducing energy consumption and CO_2 emission during the whole life cycle. Higher insulation can be achieved by improving bulk or surface properties in combination with novel mortars, plasters and coatings.

Scope: Proposals should address the development of new materials and/or solutions for building envelope components with reduced embodied energy, lower CO_2 emissions and improved insulation properties during operation. The new components may also contribute to improve indoor air quality, by limiting VOCs emissions and/or by advanced properties aiming to absorb and biodegrade indoor contaminants. The proposed solutions should go well beyond the state of the art and take into account the final performance properties of the new materials and of the respective building components.

The following factors should also be considered: enhanced durability for increased use duration, reduced maintenance and consequently reduced costs, respect of sustainability principles (the sustainability of each developed solution should be evaluated via life cycle assessment studies carried out according to the International Reference Life Cycle Data System - ILCD Handbook); application to both new build and renovation; lightweight construction and ease of installation; realistic solutions at a reasonable price; increased comfort and noise reduction. Recycling/reuse of materials may also be addressed. Standardisation aspects can be considered particularly in relation with the work carried out in CEN/TC 350.

Proof of concept in terms of one (or more) component(s) containing the new materials developed should be delivered within the project, excluding commercially usable prototypes (2006/C323/01), but convincingly demonstrating scalability towards industrial needs. Information guides for applications, installation and training on the new solutions should be provided before the end of the project. The participation of public authorities may also be an asset for the proposals, as public authorities own a large part of the building stock at European level.

To maximise their impact, the funded projects will be expected to cluster with each other in order to facilitate research cohesion, integration, and advancement of the EeB-PPP agenda.

Activities expected to focus on Technology Readiness Level 6 and above.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact: Compared to state of the art materials and components, the newly developed materials should bring:

- Reduction by at least 30% of the embodied energy and CO_2 at component level;
- Improvement by at least 20% of insulation properties;
- Reduction by at least 15% of the total costs compared to existing solutions;
- Demonstration of at least a 5% reduction of the energy spent during the whole life cycle of a building;
- Improvement of the quality of information from product manufacturers to facilitate better decision making;
- Strengthening of the competitiveness of the European construction sector in the field of "green" construction technologies.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 2 – 2014: Adaptable envelopes integrated in building refurbishment projects

Specific challenge: The refurbishment of the existing building stock requires ground-breaking strategies in order to meet targets for reduced energy use and greenhouse gas emissions. One of the most important components to be addressed with an innovative approach is the building envelope, which has to develop into an active rather than a passive element, meeting more functions than just the separation of the outer space from the interior with insulation.

The concept of adaptable envelope is twofold. On the one hand, it is designed to accommodate further modifications (such as future renovation or technology upgrades). On the other hand, the envelope is able to adapt to a dynamic and intricate environment by measuring and processing multi-source information (e.g. outdoor and indoor environment conditions, occupancy, behaviour of users and envelope performance) in order to respond to the building occupant's instructions and to evolving environmental conditions in an appropriate timing and extent.

Scope: Proposals should address breakthrough solutions to improve roof and façade functional characteristics to enable the building envelope to adapt to a dynamic, mutable and complex environment during its lifetime. Research is expected to cover for example, advanced materials or technologies for energy generation and storage; smart and performance insulation materials; near infrared reflecting and cool coatings; adaptable innovative pre-cast solutions; strategies for improved air quality, moisture control, ventilation control and energy recovery; enhanced acoustic properties; improved fire resistance; automated blinds or movable sun barriers with interrelated issues of summer overheating, air-tightness and natural light use; integration of innovative sensing systems to control and optimise the real time performance of the envelope; or advanced building control systems to control the active envelope.

In addition, proposers should also seek to include in the adaptable envelopes features that could facilitate the future renovation or conversion of the whole or part of the building (fostering creativity and an active role of architects and engineers at design stage), such as:

- Adaptability to different shapes, taking into account tolerances, façade conditions, stability of existing façades, building orientations and general conditions of the building during its lifetime;
- Conversion of rooms, or buildings, to new usage;

- Possibility to integrate new solutions (upcoming technologies) and systems, covering the whole cycle from component design, to the structural aspects and to their installation;
- Self-adaptation, which is important in relation to current weather and building load situation, and changing use patterns (including new users, or family instead of single users).
- The integration of the active envelope with building control systems to provide real time control to the envelope according to actual environmental conditions and/or energy demand.

Clear evidence of technical and economic viability should be provided by validating and demonstrating the proposed adaptable envelope in real case retrofitting projects.

Activities expected to focus on Technology Readiness Levels 4-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Total (primary) energy consumption reduction by a factor 2 to 4 with respect to the values before installation of the adaptable envelope.
- Improved indoor environment.
- Demonstration of the replicability potential in a real case-study.
- Provide solutions with a return on investment below 7 years.
- Validation and market uptake of active building elements.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 3 – 2014: Development of new self-inspection techniques and quality check measures for efficient construction processes

Specific challenge: Today's availability of better energy-efficient building components (envelopes, windows, equipment etc) demands that these benefits will not be lost through lack of knowledge or bad implementation during the construction processes which may affect the final performance of the building. Critical components to energy efficiency have indeed proven to have significant impact for buildings. With today's high energy prices, a proper understanding of critical components to energy efficiency is crucial in terms of savings and comfort. In addition, the construction sector is characterised by a segmented approach involving a variety of skills and expertise with different role and responsibility. During construction, each actor of the construction value chain must ensure that its contribution fits into a quality framework defined collectively at the design level. Self-inspection and quality checks are implemented to guarantee the final thermal, acoustic and energy performance of the building which will be quantified during commissioning. This means that quality control is of utmost importance to guarantee that the energy performance at commissioning stage will meet the one expected at design stage.

Scope: The research focus is on new self-inspection techniques and quality check measures

for efficient construction processes enabled by portable and robust systems that can be easily handled in the construction site. In particular methods for energy related self-inspection, for example to avoid the presence of thermal bridges or to ensure and control good air-tightness in low energy or passive buildings should be considered. The possibility to measure U values over large areas with non-contact solutions would allow assessing the conformity to design during refurbishment. The techniques to be developed should also be able to avoid or reduce economic and time deviations of the construction processes.

The solutions proposed should preferably be cost-effective and easy to use, considering that they will be implemented on-site by workers which are not necessarily highly skilled. The solutions should be validated in a relevant construction environment.

Execution details brought to the construction site are of paramount importance to improve the overall quality. These execution details need to take into account the specificities of the building project but also the installation rules defined by building component manufacturers in order to avoid any misinterpretation on the construction site and therefore to contribute to bridging the gap between design and construction. The research should consider some peculiarities of working environments in the construction sector, such as geographical dispersion and heterogeneity of subcontractors.

Activities expected to focus on Technology Readiness Levels 4-6. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- To guarantee the final thermal, acoustic and energy performance of the building while increasing the efficiency, reliability and productivity of the construction processes.
- To provide innovative techniques to measure the contribution of each critical component to thermal insulation, air-tightness and building services equipment in energy efficient construction.
- To provide guidelines, methodologies for workers and contribute to standardisation activities.
- Reduction by at least 50% of the mismatch of energy performance between design stage and commissioning stage due to construction processes.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 4 – 2014: Support for the enhancement of the impact of EeB PPP projects

Specific challenge: Dissemination, exploitation and transfer of projects results are crucial activities during project life-time and beyond in order to make sure that projects have the expected impacts. Clustering of project activities, according to objectives and addressed themes, and their inter-linking with existing technology transfer activities, are effective ways to stimulate the take-up of project results and to exploit synergies. An adequate monitoring of such activities during the project life-time and beyond is also needed, to ensure an effective implementation at programme level.

Scope: The coordination actions shall aim in particular to actively cluster existing activities under the EeB PPP. The initiative, which is expected to last 2 years, will require close collaboration with relevant industrial associations and technology transfer programmes.

Activities may include:

- Review of recent technological developments, publications, international RTD and innovation programmes within the area of the cluster
- Workshops with top-ranked international experts from various disciplines aiming at the elaboration of future EeB priorities within the area of the cluster.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 500 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

The impact on the areas of application of the projects is expected to be:

- Speeding up industrial exploitation and take up of results of EeB PPP projects.
- Stimulation of networks and alliances for further RTD and industrial innovation in the addressed technology and application areas, including the development and practical application of a clustering model.
- Additional added value beyond the original scope of the EeB PPP projects by exploiting synergies and sharing best practice. Increased public presence and awareness of EeB PPP activities.
- More effective execution of activities of common interest, such as training & education, IPR management and standardisation.
- Anticipation of business trends and market prospects.

Type of action: Coordination and Support Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 5 – 2015: Innovative design tools for refurbishment at building and district level

Specific challenge: The development of sustainable solutions for refurbishment of buildings and their proper integration at district level requires major innovations in the design tools, construction methods and management practices, including socio-economic aspects and innovative financing instruments.

Buildings should no longer be renovated individually, but as part of a global energy system, where their interactions with their environment can be predicted and simulated, as well as taking into account interactions with inhabitants and customers. Design tools should also support the evaluation of different retrofitting alternatives.

A challenge is to ensure the interoperability between tools from various domains and at different scales. But more importantly, knowledge collection and management in the fields of refurbishment issues should be developed and implemented in order to propose solutions adapted to collaborative multi-disciplinary refurbishing work.

Scope: Research activities should be focused on design at buildings and district level, taking into account the adjacent systems such as district heating/cooling and decentralised thermal

energy generation and other interactions with the neighbourhood, giving priority to local renewable resources. Projects should promote and set up an integrated approach in support of innovation, by providing actors with holistic methods and tools. Energy efficiency technologies should become elements of design databases that allow stakeholder to select the most suitable approach for performance improving, taking full advantage of geo-clustered data sets. The design phases linked to the retrofitting of existing buildings taking into account subsequent operation and maintenance will be considered as priority. In this respect, there is a need for further research on operational information that can be used in design models. Knowledge based design can also be used to provide input into management systems.

Projects should also cover validation actions on a technical level, which apply the tools on refurbishment projects; and on a societal level, i.e. validation with the occupants of the building. For the latter, involvement of organisations within an Integrated Project Delivery Approach, supporting a participatory design approach, could be an asset.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- More effective refurbishment at building and district level.

- Optimised design of integrated energy-efficient buildings, considering the different physical dimensions in a coupled and holistic way (energy, comfort, air quality, acoustics etc.), enabling actors to take validated and quantified choices for the refurbishment at building and district level on the basis of quantified performance objectives with compliance with regulation and user-oriented comfort expectations and constraints .

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 6 – 2015: Integrated solutions of thermal energy storage for building applications

Specific challenge: Storage plays a pivotal role in synchronising energy demand and supply, both on a short and long term (seasonal) basis. Transformation of our existing building stock towards very low energy buildings and nearly zero energy and Plus-energy buildings requires effective integration and full use of the potential yield of renewable energy. Thermal storage is a key priority to make such a step, particularly considering the energy renovation of the existing stock, where compact building level solutions are required.

Scope: Proposals should address advanced solutions required to reduce thermal losses, reduce pressure drops, and improve heat exchange in and between storage material and heat carrier. Having in mind a system approach, innovations are required at different levels. High energy

density storage materials are needed in terms of long term multi-cyclic stability at tuneable temperature levels. These advanced energy storage materials should allow regeneration temperatures in a range below 100°C to enable a higher efficiency and effectiveness of thermal energy storage of at least 6 times the energy storage density of water. Furthermore, an additional innovation may concern storage reactor components, in particular the heat exchanger. With respect to the entire storage system, advanced energy management is needed, including smart algorithms for (dis)charging at different temperatures, and simple and robust control equipment. These storage solutions should be enabled by material innovations that are safe and environmentally friendly.

Small scale demonstration of the technical (with compactness as a crucial boundary condition) and economic feasibility of such storage systems at the level of components and systems in relation to space heating and cooling and/or domestic hot water systems of a single building are expected, validating a systemic approach in system integration and scalability in near real life operating conditions.

Activities expected to focus on Technology Readiness Levels 4-6.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Provide advanced thermal energy storage solutions.
- Demonstrate solutions that have a stable long term performance in multi-cyclic seasonal use of at least 20 years.
- Validate in the case of pumpable energy storage materials, an energy density comparable to the best solid-gas systems.
- Deliver compact systems with the potential to fit in the limited space available in a single building in the existing housing stock. The storage material volume per dwelling should not exceed 2.5 m^3.
- Solutions should demonstrate a potential to reduce the net energy consumption of a building by at least 15% and a have return-on-investment period below 10 years.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 7 – 2015: New tools and methodologies to reduce the gap between predicted and actual energy performances at the level of buildings and blocks of buildings

Specific challenge: The monitoring of real energy use in energy-efficient buildings frequently shows major differences with respect to the predicted performance. This is even worse if a set of interacting buildings is considered. It is therefore important to capture the real complexities of the energy performance of the actual buildings and districts. In addition, effective methodologies for the correct understanding of user behaviour need to be addressed.

Scope: At building level, the research focus is on developing methodologies and tools to monitor and assess actual building energy performance, considering relevant factors such as user behaviour, complex energy systems performance and weather forecast, and to be able to predict accurately building energy loads and consumption along the whole lifecycle. The new

methods and tools could include energy performance diagnostics for predictive maintenance (related to different construction typologies and their thermal behaviour), to provide the accuracy required to properly value retrofit technologies and support decision making during the different stages in the life of the buildings. The effective monitoring and management of energy flows to reduce energy consumption and to ensure that the building is operated in a way that meets design intent should also be addressed. Common indicators, measuring technologies and data analysis methods should be developed to monitor building performance during operation.

A holistic "open" approach to building control and monitoring systems is required, integrating any possible existing control and monitoring infrastructure. The commissioning, sign-off and maintenance phase should be addressed. High quality, reliable and non-intrusive (including wireless) data acquisition methodologies are also needed. A positive impact on health and safety (e.g. hygienic aspects of ventilation or DHW systems) as well as comfort is an aspect to consider.

At the level of a block of buildings, the focus will be on real time optimisation of energy demand and supply using intelligent energy management systems with the objective of reducing the difference between peak power demand and minimum night time demand.

Cost-effective and interoperable solutions should be demonstrated for a block of buildings consisting of at least 3 different buildings in real life operating conditions. Autonomous power systems at district level could be considered.

The role of players such as ESCOs, facility managers and third parties to certify performances should be considered in line with future requirements for energy performance contracts and rating of buildings with a life cycle perspective.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Significant reduction in the difference between real and predicted energy behaviour in a building or a block of buildings, after the demonstration of the viability of the new tools and methods for measuring and analysing real building energy performance.
- The gap is narrowed down to a value consistent with energy performance contracts.
- Provide solutions with a high replication potential.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

EeB 8 – 2015: Integrated approach to retrofitting of residential buildings

Specific challenge: Europe is facing the challenge of deep rehabilitation of residential buildings (including buildings of historic value) while lowering the costs of refurbishment. Nowadays at the scale of Europe, fossil energy is mainly used in residential buildings for two usages which are space heating and Domestic Hot Water production. Such a large building stock needs innovative, efficient and cost-effective retrofitting solutions to meet the planned net-zero energy standards. Moreover, due to the current economic crisis investment capability in building retrofitting is limited and public incentives tend to decrease. Breakthrough solutions are, therefore, needed which combine affordability along the whole life cycle, reduced maintenance and higher performance reliability with reduced energy use.

Scope: Systemic approaches need to be developed which integrate the most promising cost-effective technologies and materials. The solutions could include, for example, energy use through innovative heat pump systems; combination of renewable energy sources at building level; exploitation of heat recovery for water and air as well as ICT, enabling to adapt the system to the end-user behaviour without losing control of the global efficiency of the system.

In combination and synergy with the efforts addressing envelope improvements to reduce drastically the buildings heat needs, a systemic approach related to space heating and Domestic Hot Water (DHW) needs to be developed, having in mind that in the coming years DHW is going to be the first thermal need in residential buildings. The risk of overheating should be also analysed together with the whole renovation solution.

The district scale, as well as the interactions between the buildings and the thermal and electrical energy networks (i.e. impact on the energy demand) should be taken into account. Innovative solutions with a high degree of flexibility with regard to the grid are required by realising the full potential of ICT and control system solutions. The integration of (compact) thermal energy storage should play a pivotal role as moving the demand from peak periods to other ones or yielding the full potential of renewable. The approach should be based on a methodology incorporating modelling, simulation, virtual reality, with the aim of identifying the optimal cost-effective solutions. Standardisation issues to facilitate integration of system components should be addressed.

Energy efficiency should be addressed by proper system integration and installation, e.g. through synergy between technologies which have already been proven at a small scale and need a larger scale demonstration.

Financial models should be validated too, in order to ensure the feasibility of the replication of deep energy efficiency rehabilitation of residential buildings in Europe, where the current economic crisis originates important socio-economic barriers.

A high replication potential is necessary while taking into account the supply chain issues. At least two demonstration sites should be considered in two different climatic conditions in order to ensure that the technologies are as widely applicable as possible. The impact at district level should be taken into account when defining the overall approach and should be reflected in the selection of the demonstrators.

In addition, to ensure appropriateness of business models, the participation of building owners (private or public organisations) is recommended. User involvement in renovation processes will require special attention, in particular when a deep retrofitting is required. Social and behavioural aspects are critical factors for project success. In parallel, new low intrusive techniques and the utilization of tools and technologies that speed up construction processes with high quality standards are welcome.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 4 and 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Demonstrate innovative retrofitting solutions as real cases approaching net zero energy standards.
- Reduction of at least 60% in energy consumption compared to the values before renovation while ensuring affordability.
- Demonstrate a high replicability potential.
- Return on investment should be below 7 years in the case of deep retrofitting.
- Advent of a new generation of skilled workers and SME contractors in the construction sector aware of the need of a systemic approach towards energy efficiency should be promoted through the proposed activities.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LEIT CALL FOR EEB – ENERGY-EFFICIENT BUILDINGS

H2020-EeB-2014/2015

CONDITIONS FOR THIS CALL

Publication date: 11 December 2013[52]
Deadline(s): [53] [54] at 17.00.00 Brussels time on the following dates

Topic identifier	Deadline	Deadline
EeB 1-2014 EeB 2-2014 EeB 3-2014 EeB 4-2014	20/03/2014	
EeB 5-2015 EeB 6-2015 EeB 7-2015 EeB 8-2015		09/12/2014

Overall indicative budget: EUR 49.50 million from the 2014 budget[55], and EUR 64.00 million from the 2015 budget[56]

All single-stage	2014	2015
Topic identifier	EUR Million	EUR Million
EeB 1-2014 EeB 2-2014 EeB 3-2014 EeB 4-2014	**49.50**	
EeB 5-2015 EeB 6-2015		**64.00**

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

[53] The Director-General responsible may delay this deadline by up to two months.

[54] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

[55] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[56] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

EeB 7-2015 EeB 8-2015		

Eligibility and admissibility conditions:

The standard eligibility conditions apply, described in parts B and C of the General Annexes to the Work Programme, with the following exceptions:

Proposals for Research & Innovation and for Innovation Actions should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.
For topics EeB 5, 7, 8, these initial plans may address private funds, or assess synergies and possible cumulative funding with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds related to smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3[57] may be useful.[58] The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

Evaluation criteria:

The standard evaluation criteria apply, described in part H of the General Annexes to the Work Programme, with the following exceptions:

The threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.
In case of equal overall scores in the ranked list, the priority order of proposals will be established in accordance with part H of the General Annexes, except that proposals will be ranked on the basis of individual scores for the Impact criterion before the Excellence criterion.

Evaluation procedure: The full evaluation procedure is described in the relevant guide associated with this call.

- Indicative timetable for evaluation and grant agreement[59]:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
	Maximum 5 months from the final date for submission	*Maximum 3 months from the date of informing applicants*

Consortium agreements: Signature of consortium agreements will be compulsory before the signature of the Grant Agreement for all Research and Innovation and all Innovation Actions.

[57] http://s3platform.jrc.ec.europa.eu

[58] The relevant Managing Authorities can be found at http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

[59] Should the call publication postponed, the dates in this table should be adjusted accordingly.

Call for SPIRE – Sustainable Process Industries

H2020 – SPIRE -2014-2015

The European process industry is uniquely positioned as it represents the economic roots of the European economy (by transforming raw materials into intermediate and end-user products). It thus sits at the core of most industrial value chains via discrete manufacturing into e.g. automotive and housing sectors. The SPIRE Public-Private Partnership (PPP) brings together cement, ceramics, chemicals, engineering, minerals and ores, non-ferrous metals, steel and water sectors, several being world-leading sectors operating from Europe. These sectors all have a high dependence on resources (energy, raw materials and water) in their production and processing technologies and they all have a clear and urgent interest in improved efficiency and competitiveness which actually leads to driving the implementation of many European policies. The sectors in the SPIRE PPP represent a key part of the manufacturing base in Europe (EU27), including more than 450,000 individual enterprises. They have over 6.8 million employees, generating more than 1,600 billion € turnover. As such they represent 20% of the total European industry, both in terms of employment and turnover.

Resources are becoming increasingly scarce, and resource efficiency has become an exceedingly important factor in industry. This is especially true for resource and energy intensive industries such as the process industries. The general goal is to optimise industrial processing, reducing the consumption of energy and resources, and minimising waste.

The specific goals are:

- A reduction in fossil energy intensity of up to 30% from current levels by 2030.
- A reduction of up to 20% in non-renewable, primary raw material intensity compared to current levels by 2030.
- A reduction of greenhouse gas emissions by 20% below 1999 levels by 2020, with further reductions up to 40% by 2030.

An important part of the horizontal activities in SPIRE are training and business models. The integration of relevant training/learning as well as identify appropriate business models to ensure subsequent market implementation and potential barriers for cross sectorial technology transfer is expected.

Proposals are invited against the following topics:

SPIRE 1 – 2014: Integrated Process Control

Specific challenge: Process control of the industrial operations has a major role in assuring high quality standards and optimal operations in terms of resource use and economic viability. Technological progresses in this area that could allow measuring properties of process streams and final products, accurately and in real-time could represent a major step forward towards more reliable and sustainable industrial operations. These real time process data (e.g. chemical composition or biological contamination data) could allow the implementation of "near real time" closed-loop process control concepts making it possible to operate industrial processes at their optimum both economically and ecologically while ensuring high level of safety. To obtain real time process data, the development of reliable fast inline measurements will be fundamental. These measurements can easily be integrated into closed loop process

control concepts, thus delivering the highest value and near real time process control for industrial operations and decision-making support tools, facilitated, for instance, by integrated databases covering measurements and computational data. The development of these new "near real time" integrated process control methods is particularly important considering the recently introduced intensified or modularised production concepts, e.g. presenting smaller continuously operated pieces of equipment or integration of process steps that pose new challenges for process analytics in terms of size and speed of analysis.

Scope:

New technologies suitable for "near real time" integrated process control are expected to introduce significant novelties with respect to sensor technologies, data treatment and data mining, in particular:

- Provision of dynamic information about product properties, stream characteristics and process conditions.
- Provision of spatially resolved process data.
- Data management for processes optimisation.
- Sensors for intensified process technology.
- Fast inline measurements (instead of extractive ones).
- Robustness and reliability insuring minimum operation and maintenance costs.

Proposals submitted under this topic should address several aspects which are considered of major importance in this area; such as:

- Cross-sectorial application of process analyser technology (PAT) and product measurement techniques (PPMT) in closed-loop process control capable of inline measurements.
- Integration methodologies within a large number of production conditions.
- Swarm sensors.
- Development of new soft-sensors and sensing concepts and models for improved process control using PAT data for the measurement of properties and quality of process streams and final products.
- Miniaturised PAT- and PPMT-based advanced control for intensified processes.
- Disposable sensors in batch and in continuous processes.
- Control strategies for flexible processes or disposable sensors using integrated and validated PAT data.
- Process and Product life cycle management.

Proposals submitted under this topic are expected to demonstrate the proposed technologies and control systems in relevant industrial environments, to prove their technical feasibility and economic viability.

Activities expected to focus on Technology Readiness Levels 3-5. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Improved capabilities for valid, reliable and real-time measurement of the properties and quality of process streams and final products for existing and for more flexible process operation concepts.
- More sustainable plant operations due to the extensive usage of all information available from validated PAT and PPMT measurements for model based control.
- Improved monitoring and control of continuous plants.
- Improved support of the operators leading to safer, more reliable and sustainable process operation improving process efficiency.
- Better process operations with respect to resource and energy efficiency.
- Significant decrease in greenhouse gas emissions.
- Strengthening of the competiveness of the European industry both in the domain of PAT technologies and control solutions and with respect to economically sustainable industrial processes.
- Retention and creation of jobs for the European measurement and automation and process industries.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 2 – 2014: Adaptable industrial processes allowing the use of renewables as flexible feedstock for chemical and energy applications

Specific challenge: Use of biomass, residues and waste gases as feedstock/raw materials in industry to produce green chemical building blocks and energy is expected to increase significantly in the coming years. This will play a vital role in the establishment of a more sustainable and low carbon industry. However, the increased use of biomass, residues and waste gases as feedstock/raw materials in industry poses a number of challenges that need to be addressed, such as seasonal and fragmented availability, short harvesting windows, environmental challenges, variable availability and/or quality of supply, and presumed competition with animal or human food supply. In addition, it is important to develop highly efficient equipment using novel techniques and evaluate the use of biomass and residues as feedstock for co-firing in industrial processes to detect potential operational problems. Changing markets and making new links in the value chains will be an added challenge in the future production systems based on cross sectorial integration. These challenges have to be overcome in order to allow increased utilisation of biomass residues and waste gases in the industry.

New approaches have demonstrated that small mobile and flexible units with chemical processing and process intensification capabilities could provide several advantages in comparison to fixed facilities, such as operation in a distributed manner and mobility to different locations providing higher flexibility. This could provide convenient business opportunities especially for processes presenting a variable feed supply, fragmented feedstock availability and/or need for mobility to different locations to maximise usage time.

Scope: Projects should develop new processes or improved valorisation approaches that would provide efficient biomass, residue and waste gas conversion (or biomass pre-treatment for further refining) while developing a fully integrated system and the associated equipment

for downstream use. These processes should allow an increased utilisation of renewables (where economically and technically favourable relative to other potential applications) as feedstock for the production of chemicals (including intermediates) and/or fuels as part of an integrated approach to optimise resource and energy efficiency. Such processes should be presented with a containerised, flexible and scalable approach allowing for (pre-) processing of biomass, residues and waste gases at locations closer to the supply. The proposed solutions should be able to cope with the seasonal or even daily fluctuations of the renewable source to be used. In this respect the unit should also be able to process feedstock from different sources in order to guarantee the level of supply.

The proposed solutions should provide economically viable alternatives to current practice in biomass processing and demonstrate business feasibility. Moreover, new innovative technologies and approaches are expected to substitute the current fossil fuels by renewables as feedstock. LCA and LCC analysis for the proposed processes is needed in order to prove the sustainability of the solutions. It is desirable to develop and demonstrate a multi-sectorial and replicable methodology for increasing the renewable resources integration in industrial processing. It is expected that high amounts of biomass, residues and waste gases will be further used in energy intensive industries, enhancing the efficiency in the use of these resources. Substantial demonstration activities in conjunction with the development of solution-adapted equipment are expected.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Level 5-7. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Economically viable solutions and technologies allowing a reduction in fossil resources intensity of at least 30%, compared to current practices (for already optimal processes the savings could also come from reduction in fossil energy for feedstock transportation). It should lead to increased utilisation of renewables in the industry as feedstock for the production of chemicals (and/or intermediates) and/or fuels as part of an integrated approach to optimise energy efficiency with a proven sustainability, taking into account environmental issues and competition with food. In addition, the solutions are expected to contribute to the reduction of greenhouse gas emissions.

- The technologies developed should integrate well in the current industrial landscape providing finished products and/or intermediate and building blocks that could be processed in already existing industries.

- They could also show a direct or indirect impact on rural areas, arising from the increased use of biomass and residues production locally.

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 3 – 2014: Improved downstream processing of mixtures in process industries

Specific challenge: Current operations for the separation and fractionation of solid, gas and liquid mixtures represent on average 20-70% of the total capital and operating costs for most of the current plants in the process industry. These operations are also very energy-consuming, as they account for up to 45% of all the process energy used, for example, by the chemical and raw materials refining industries. Major improvements of these processes leading to more efficient and cost effective solutions are paramount in achieving a more sustainable European industry.

In this respect, hybrid technologies combining different techniques, such as distillation, membrane permeation, adsorption, extraction, etc. have already been applied successfully to a number of industrial processes. They can provide a cost effective solution to achieve major improvements in separation and fractionation operations, leading to waste reduction, lowering greenhouse gas emissions, and improved energy efficiency.

To realise the full potential of these technologies, further investigation and a deeper understanding are required of hybrid separation techniques (e.g. distillation, extraction, drying, crystallisation and reactive separation), in particular leading to a better understanding of how the different components interact with each other. This may also facilitate the transition from batch to continuous processes in the next generation of plants, increasing yield, purity and quality of products while improving productivity.

To enable the deployment of innovative highly-efficient separation and fractionation technologies in industry, the development of new approaches for the design and scale up of the overall production processes might also be required. If possible, these innovative approaches should regard the primary process and the downstream separation as one single, integrated process.

The aim is to provide innovative solutions for downstream processing, advance in the integration of different separation techniques into complex hybrid units and provide tools for the design of such units.

Scope: The proposals should provide a proof of economic and industrial feasibility for the new technologies. The proposed solutions should also have potential for integration in the current industrial scenario, and should be suitable for different sectors in the process industry. Important aspects that should be taken into considerations are:

- Compatibility with continuous processes and support for the transition from batch processes to more efficient and reliable continuous operations (where relevant).
- Reduction of production costs and time to market by providing tools for process and separation unit design and optimisation.
- Significant improvements in energy and resource efficiency.
- Significant reduction in greenhouse gas emissions.
- Improvement in safety of the work environment.

Projects are expected to carry out demonstration activities in industrial environments aimed at proving the industrial relevance and feasibility of the proposed technologies, clearly showing the potential integration into current plants.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

Activities expected to focus on Technology Readiness Levels 5-7.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Novel and cost effective separation and fractionation technologies applicable to the process industry.
- Increasing the resource and energy efficiency for the process industries by at least 20% while leading to a significant decrease in greenhouse gas emission.
- Strengthening the competitiveness of the European industry developing both engineering know-how as well as economically sustainable industrial processes leading to shorter time to process/market, and higher production capacity.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 4 – 2014: Methodologies, tools and indicators for cross-sectorial sustainability assessment of energy and resource efficient solutions in the process industry

Specific challenge: Innovative technologies for resource and energy efficiency require a consistent sustainability assessment across sectors and along the value chains. There is a need to increase the European knowledge base related to applied sustainability assessment tools, methodologies, indicators and to overcome the bottlenecks for cross-sectorial take-up and further development in the process industry.

Scope: The support action should involve a study across multiple sectors in the process industries considering all aspects of sustainability assessment along the whole product life cycles with regard to resource and energy efficiency. The outcome of the study should incorporate:

- A comparative overview of currently used methodologies, tools, indicators and practices in different sectors,
- A selection of the most appropriate solutions, based on their demonstrated robustness and their ability to provide simplified and easily communicated data,
- An overview of the related opportunities as well as the bottlenecks towards further development and cross-sectorial replication/transfer of these approaches,
- Definitions of the required steps to accelerate further uptake of resource efficiency indicators over the value chains, and
- Recommendations on the most suitable tools for management and decision making at research lab, plant, company, sector and multi-sectorial level.

The study should allow for the customisation and development of sector-specific tools, for example regarding boundaries of the system, and including technical aspects for each industry.

Strategies should be proposed to work with value chain partners, public authorities and final users, in particular to meet expectations in terms of relevant sustainability assessment (e.g. standards, labelling), and create a broad range of options to raise awareness levels and understanding of sustainability. The study should produce recommendations as input for further research and development projects in the field of sustainability assessment.

Collaboration with standardisation bodies should be addressed**.**

The methodology should also address the needs of companies operating in data -lean environments.

The Commission considers that proposals requesting a contribution from the EU between EUR 250 000 and 500 000 would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Identification of best practices over different sectors for environmental, social and economic sustainability indicators to facilitate cross-sectorial deployment.
- Identification of the research needs in this area to achieve a set of environmental, social and economic sustainability indicators suitable for the process industry.
- Identification across the different sectors of the process industry of a set of tools for management and decision making at research lab, plant, company, sector and multi-sectorial level of the process industry.

Type of action: Coordination and Support Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 5 – 2015: New adaptable catalytic reactor methodologies for Process Intensification

Specific challenge: The reduction of the number of steps and unit operations in industrial processes is a key factor in achieving process intensification, improving the efficiency in the use of resources, and reducing the impact on the environment. Continuous scalable processes using intensified equipment are key to enable flexible and decentralised production at high process performance.

Scope: Projects should develop new adaptable reactor concepts to reduce the number of process steps and unit operations for industrially relevant processes, by the redesign and merging of critical reaction steps and subsequent process steps, such as separation and work-up or by allowing new operating windows that are not accessible using conventional equipment. Projects should include the design of the corresponding reactor equipment, in close co-operation of the engineering and equipment manufacturing sectors with process industries.

Application areas targeted include new adaptable catalytic schemes; or reactors and processes allowing for operation at high pressure and/or temperature for a substantially increased space time yield.

The integration and optimisation in relation to full process engineering assessment should be explored. The impact of the new process solutions should be proven through process modelling and assessment, and quantified in terms of resource intensity reduction as well as reduction of emissions. Depending on the scale of the industrial processes included in the project, it would be beneficial to consider their implementation within modular or containerised set-ups.

Activities expected to focus on Technology Readiness Levels 3-5.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Reduction of at least 15% in process energy intensity and material resource use for relevant large volume industrial processes.

- Reduction of at least 15% in emissions compared to the present state of the art. Significant improvements in the flexibility and productivity of industrial processes.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 6 – 2015: Energy and resource management systems for improved efficiency in the process industries

Specific challenge: manufacturing sustainability has been improved considerably in environmental, economic and social terms, by sharing resources (e.g. plants, energy, water, residues and recycled materials) through the integration of multiple production units of a single company or multiple companies on a single industrial production site. Nevertheless, a more general cross-sectorial interaction is needed for a major impact within the process industry. This could take a long time to achieve and the aim is to pave the way for future

cross-sectorial interactions and potentialities in the development of holistic measurements and activities.

Currently, poor understanding of each other's processes is hindering the development of technical and non-technical interactions and exchanges, which are necessary for industry to properly face the challenges.

Scope: Projects should enable the implementation of a broad variety of technologies, encompassing a wide range of disciplines, such as fundamental science, and plant engineering and management. The integration into a single management system of all these environmental, energy and economic factors is key for the improvement in efficiency of the process industries.

The proposed research should focus on the following areas:

- Analysis and optimisation tools for flexible energy use and material flow integration should be developed, aiming at a holistic approach for resource management in process industries, suitable both for small and large scale in a flexible approach. To facilitate a proper dissemination and use, it is expected that standards-based software for measuring critical footprint issues and relevant data used into the daily routine of the plants/clusters will be developed.
- Rapid transfer from lab-scale and conceptual design into testing at demonstration sites, using realistic industrial streams and process conditions. Pilot tests should focus on integrated solutions and tools adapted to the specific conditions in real production units. This will facilitate future industrial symbiosis between different sectors, by integrating energy and material flows within existing industrial parks.
- New approaches that perform cost-saving optimisation of energy and resources supply and demand, in order to reduce the residues and costs in intensive industries, taking into consideration both economical and sustainability constraints.

Prototypes and pilot implementations in real industrial settings represent a clear added-value.

Activities expected to focus on Technology Readiness Levels 4-6. A significant participation of SMEs with R&D capacities is encouraged.

The Commission considers that proposals requesting a contribution from the EU between EUR 3 and 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Holistic energy and resource management systems should facilitate significant gains in sustainable processing with regard to several parameters (resource efficiency, energy efficiency and the emission performance).

- Optimisation of interdependencies and the identification of technology components allowing for a breakthrough regarding a cost effective reduction in the use of resources, which overcomes the difficult cross-company collaboration.

Optimisation of energy and resources supply and demand in selected areas should reduce the overall costs in energy intensive industries by at least 15%, by taking into consideration both economic and sustainability factors.

Type of action: Research & Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 7 – 2015: Recovery technologies for metals and other minerals

Specific challenge: Metals and other minerals, such as non-ferrous and ferrous metals, ceramics, glass, cement and chemicals are utilised in numerous applications in many industrial sectors. Their demand, in particular those used in specialised applications, will increase in the coming years. Because of their increasing importance or economic value, a key issue is the development of processes for an effective and efficient recovery of these materials, from primary sources or from waste streams of the current industrial processes. Novel integrated recovery processes should result in increased resource efficiency and sustainability for the European industry, allowing the recovery of significant amount of metals and other minerals, even from low concentration streams. This should lower the dependency on imports of these materials, sheltering Europe from possible shortages in supply and reducing production costs and environmental impacts.

Major improvements in separation processes are needed to achieve an efficient and cost effective recovery from the different streams in the process industries.

Scope: new approaches combining several existing techniques (e.g. precipitation, adsorption, extraction, physical or biological treatment and separation) or new alternative solutions could provide a cost-effective way to achieve major improvements in the efficiency of recovery operations for metals and other minerals, leading to waste reduction and minimising the environmental impact of industrial operations.

The proposed solutions should also have potential for integration in the current industrial scenario, and should be suitable for different sectors in the process industry. It is essential to consider the compatibility of the technologies with currently existing plants, taking into consideration the capital -intensive nature of some industrial sectors involved.

Demonstration activities should focus in the following research areas:

- Innovative technologies for minerals and metals treatment from solid, gaseous and/or liquid waste streams.
- Development of new approaches for the design and scale up of industrial processes. In particular, these innovative approaches should regard the primary process and the downstream separation as one single, integrated process aimed at designs that maximise not only productivity, but also resource efficiency.
- The proposed solutions should be easily integrated with the currently existing plants/technologies, taking into account the capital intensive nature of some relevant industrial sectors, providing tools for the design of such units and their integration with primary processes.

The projects selected under this topic are expected to carry out demonstration activities in industrial environments aimed at proving the industrial relevance and feasibility of the proposed technologies.

Activities expected to focus on Technology Readiness Levels 5-7. A significant participation of SMEs with R&D capacities is encouraged.

For this topic, proposals should include an outline of the initial exploitation and business plans. Wherever possible, proposers could actively seek synergies, including possibilities for cumulative funding, with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds in connection with smart specialisation

strategies. Exploitation plans, outline financial arrangements and any follow-up should be developed during the project.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Proof of economic and industrial feasibility for the proposed technologies in the process industries and showing the real potential for reducing dependency from imports. In addition, the technologies are expected contribute to the reduction of greenhouse gas emissions.
- Life Cycle and Cost Assessments for the technologies developed.
- Significant impact on the resource efficiency of industrial sectors leading to a 40% increase in recovery of materials suitable for reprocessing compared to conventional processes.
- Enhanced sustainable industrial processes, shorter time to market and higher production capacity.
- Cross-sectorial knowledge and technology transfer.

Type of action: Innovation Actions.

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SPIRE 8 – 2015: Solids handling for intensified process technology

Specific challenge: Decentralised on-site plants and modular approaches towards small- and medium-scale production will play a significant role in tomorrow's process industry. However, the use of highly intensified, miniaturized equipment is largely restricted to gas/liquid and liquid/liquid systems, while most processes applied in the chemical and pharmaceutical industry, as well as industries processing steel, glass, cement, non-ferrous metals, or minerals, involve solids as reactants, catalysts, intermediates or (by-)products. If these processes are to be transferred to intensified process equipment, it is likely that difficulties associated with the presence of particulate solids will be encountered, such as fouling or blockages. Robust and sustainable solutions to these problems are hardly available. This hampers the industrial realization of processes involving solids handling.

A further challenge of increasing importance for these industries comes from the increasingly demanding customer expectations with regard to product properties. These specific needs have to be met by developing fast and flexible processes that allow for design and development of tailor-made products while keeping the time-to-market as short as possible. One possible solution is to build on continuous processes, which can significantly reduce development time as well as scale-up efforts.

Scope: Methods should be developed for the handling of solids in continuous production units. This can be achieved either by the miniaturization of currently available devices or – to a great extent – by completely new approaches to the processing of solids. Projects should apply a holistic approach towards relevant processes in which solids are an intrinsic part. Rather than the core processes for solids handling, the whole process design should be considered, in particular downstream processing operations such as catalyst recycling, solids isolation, waste treatment, or waste prevention. This can be realised by means of flexible, e.g.

modular and fast process design. Such an approach would foster regionalised production. Case studies should be included on several of the following aspects:

- Metering of solids
- Advanced analytic systems
- Transport of solids
- Control of agglomeration
- Reduction of fouling
- Cleaning concepts, e.g. CIP
- Solid separation and recycling
- Regulatory requirements

Activities expected to focus on Technology Readiness Levels 5-7.

The Commission considers that proposals requesting a contribution from the EU between EUR 6 and 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected impact:

- Novel, efficient and cost effective production concepts realized in commercially available process intensified equipment, respectively process equipment modules.
- Innovative modules allowing to process solids in medium to small scale production units (particular emphasis should be given to the SPIRE sectors).
- Amelioration of chemical applications accessible via process intensified reaction systems through whole process design with focus on solids (downstream) processing operations.
- Shorter times to process/market and higher production capacity.
- Cross-sectorial technology transfer

Type of action: Innovation Actions

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LEIT CALL FOR SPIRE – SUSTAINABLE PROCESS INDUSTRIES

H2020-SPIRE-2014/2015

CONDITIONS FOR THIS CALL

Publication date: 11 December 2013[60]
Deadline(s): [61] [62] at 17.00.00 Brussels time on the following dates

Topic identifier	Deadline	Deadline
SPIRE 1-2014 SPIRE 2-2014 SPIRE 3-2014 SPIRE 4-2014	20/03/2014	
SPIRE 5-2015 SPIRE 6-2015 SPIRE 7-2015 SPIRE 8-2015		09/12/2014

Overall indicative budget: EUR 60.30 million from the 2014 budget[63], and EUR 77.00 million from the 2015 budget[64]

All single-stage	2014	2015
Topic identifier	EUR Million	EUR Million
SPIRE 1-2014 SPIRE 2-2014 SPIRE 3-2014 SPIRE 4-2014	**60.30**	
SPIRE 5-2015 SPIRE 6-2015 SPIRE 7-2015 SPIRE 8-2015		**77.00**

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

[61] The Director-General responsible may delay this deadline by up to two months.

[62] The deadlines provided in brackets are indicative and subject to a separate financing decision for 2015.

[63] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[64] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

Eligibility and admissibility conditions:

The standard eligibility conditions apply, described in parts B and C of the General Annexes to the Work Programme, with the following exceptions:

Proposals for Research & Innovation and for Innovation Actions should include an outline of the initial exploitation and business plans, which will be developed further in the proposed project.
For topics SPIRE 2, 3, 7, these initial plans may address private funds, or assess synergies and possible cumulative funding with relevant national / regional research and innovation programmes and/or European Structural and Investment Funds related to smart specialisation strategies. For this purpose the tools provided by the Smart Specialization Platform, Eye@RIS3[65] may be useful.[66] The results of these activities as well as the envisaged further activities in this respect should be described in the final report of the project.

Evaluation criteria:

The standard evaluation criteria apply, described in part H of the General Annexes to the Work Programme, with the following exceptions:

The threshold for the criteria Excellence and Impact will be 4. The overall threshold, applying to the sum of the three individual scores, will be 12.

In case of equal overall scores in the ranked list, the priority order of proposals will be established in accordance with part H of the General Annexes, except that proposals will be ranked on the basis of individual scores for the Impact criterion before the Excellence criterion.

Topics SPIRE 2, 7, 8:

The evaluation criteria are applied as follows:

1. Excellence

- Clarity and importance of the objectives;
- Soundness of the concept, including trans disciplinary considerations;
- Credibility of the proposed approach;
- Readiness of the technology for implementing the pilot;
- Progress beyond the state of the art in production.

2. Impact[67]

The extent to which the outputs of the project could contribute at the European and/or International level to:

- The expected impacts listed in the work programme under the relevant topic;

[65] http://s3platform.jrc.ec.europa.eu

[66] The relevant Managing Authorities can be found at http://ec.europa.eu/regional_policy/indexes/in_your_country_en.cfm

[67] The score for the criterion "impact" will be multiplied by 1.5.

- Soundness of the business cases and business plans and commitment to first exploitation / manufacturing;
- Evidence of the market potential and of the competitive technology advantage that will be gained through the pilot line;
- Potential of creating jobs in Europe;
- Effectiveness of the proposed measures to communicate the project, and disseminate the project results ,including appropriate management of IPR;
- Contribution, where appropriate, to standards and to skills and educational training.

3. Quality and efficiency of the implementation

- Coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources;
- Coverage of the value chain (RTOs, materials, equipment and technology suppliers and end-users);
- Competences, experience and complementarity of the individual participants, as well as of the consortium as a whole;*
- Appropriateness of the management structures and procedures, including risk management.

Operational Capacity (selection criterion)

* As a separate step in the evaluation, expert evaluators must indicate whether the members of the consortium possess at least the minimum competences needed to carry out the proposed work.

Evaluation procedure: The full evaluation procedure is described in the relevant guide associated with this call.

- Indicative timetable for evaluation and grant agreement[68]:

	Information on the outcome of the evaluation (*single stage*)	Indicative date for the signing of grant agreements
	Maximum 5 months from the final date for submission	*Maximum 3 months from the date of informing applicants*

Consortium agreements: Signature of consortium agreements will be compulsory before the signature of the Grant Agreement for all Research and Innovation and all Innovation Actions.

[68] Should the call publication postponed, the dates in this table should be adjusted accordingly.

Call for SILC II – Sustainable Industry Low Carbon II

A call is considered related to the SILC II initiative, which will be prepared through a dedicated workshop in 2014, and will be confirmed with a later decision involving the Programme Committee.

Fast track to Innovation - Pilot

It is noted that the following information is provided at this stage only to facilitate the familiarisation with this topic. The Commission will provide in due course full details, together with the announcement of the relevant calls, on the Fast track to Innovation Topic.

The general aspects of this topic are as follows:

Under this Fast Track to Innovation (FTI) pilot, proposals for innovation actions linked to any technology field will be invited, on the basis of a continuously open call (with its first cut-off date in 2015) and a bottom-up-driven logic.

Any legal entity may participate and proposals may be submitted at any time. The Commission shall initiate three cut-off dates per year to evaluate proposals. Time between a cut-off date and signature of the grant agreement or notification of the grant decision shall not exceed six months. No more than 5 legal entities shall participate in an action. The amount of the grant shall not exceed EUR 3 million.

Proposals shall be ranked according to the impact, quality and efficiency of implementation and excellence, with the criterion of impact given a higher weighting. Factors such as time sensitivity and the international competitive situation shall be taken into sufficient account when evaluating the impact of a proposal, to allow for flexibility according to the various specificities within different fields of applied research.

Other actions (not subject to calls for proposals)

1. External expertise

This action will support:

- The use of appointed independent experts for the evaluation of project proposals and, where appropriate, for the monitoring of running projects.
- The setting up of groups of independent experts to advice on or support the design and implementation of EU research policy.

Type of action: Expert contracts

Indicative budget: EUR 2 200 000 from the 2014 budget and EUR 2 200 000 from the 2015 budget (of which EUR 200 000 from the 2014 budget and EUR 200 000 from the 2015 budget for the Biotechnology call)

2. Studies and other services

2.1 Calls for tenders leading to framework contracts (not consuming budget themselves)

a) Project Technical Assistants (PTAs)

External assistance to enable detailed, prompt, pro-active, and scientifically competent follow-up by the Commission of research and innovation projects in the areas of nanotechnologies, advanced materials and advanced manufacturing and processing.

Type of action: Public procurement; one framework contract with duration of 4 years for assistance to Horizon 2020 projects, plus up to three framework contracts with a duration of 4 years for completing the assistance to FP7 projects.

Timeframe: First half of 2014

Indicative budget: the cumulated budget allocated to all specific contracts concluded over the lifetime of the framework contracts (4 years) shall not exceed EUR 14 000 000 for the framework contract for assistance to Horizon 2020 projects and shall not exceed EUR 2 500 000 for the framework contract(s) for assistance to FP7 projects.

b) Exploitation Strategy and Innovation Consultants (ESIC)

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 Exploitation Strategy Seminars, support to standardisation, support to business plan development, and support to patenting).

Type of action: Public procurement; one framework contract with a duration of up to 4 years.

Timeframe: First half of 2014

Indicative budget: the cumulated budget allocated to all specific contracts concluded over the lifetime of the framework contracts (4 years) shall not exceed EUR 4 000 000.

2.2 Allocation of budget in 2014 and 2015 to contracts and other services

a) Project Technical Assistants (PTAs)

External assistance to enable detailed, prompt, pro-active, and scientifically competent follow-up by the Commission of research and innovation projects in the areas of nanotechnologies, advanced materials and advanced manufacturing and processing.

Type of action: Public procurement; for assistance to Horizon 2020 projects, up to 3 specific contracts of up to 4½ years in 2014 and up to 6 specific contracts of up to 4 years in 2015 (all ending no more than 6 months after the end of the corresponding framework contract); for assistance to FP7 projects: 3 specific contracts of up to 4½ years (all ending no more than 6 months after the end of the corresponding framework contract).

Timeframe: From the third quarter of 2014, at intervals corresponding to project selection decisions.

Indicative budget: EUR 3 650 000 from the 2014 budget and EUR 3 350 000 from the 2015 budget.

b) Exploitation Strategy and Innovation Consultants (ESIC)

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 Exploitation Strategy Seminars, support to standardisation, support to business plan development, and support to patenting).

Type of action: Public procurement; up to 12 specific contracts with durations up to 6 months.

Timeframe: Approximately one every two months.

Indicative budget: EUR 500 000 from the 2014 budget and EUR 1 000 000 from the 2015 budget.

c) Providing data for monitoring nanotechnologies

Providing systematic and up-to-date global, national and sectoral monitoring and information for nanotechnologies (nanomaterials, nano-intermediates, nano-enabled products), taking into account all factors affecting the value chains and markets, especially the safety, regulatory and societal aspects. This will include assessing the impact of nanotechnology related policy measures and action plans.

Type of action: Public procurement; up to 3 specific contracts with duration of up to 12 months (implementing an existing framework contract).

Timeframe: Second and third quarter of 2014.

Indicative budget: EUR 1 000 000 from the 2014 budget

d) New market opportunities through frugal innovation

Frugal (inclusive) innovation is the process of reducing the complexity and cost of a good by removing non-essential features of e.g. a car or phone, and has the potential of addressing new markets. This may also involve the re-engineering of traditional techniques by re-visiting the

scientific base of technologies and know-how elaborated over centuries. Key enabling technologies, such as advanced materials and advanced manufacturing, can play an important role. The analysis of the potential of frugal innovation in a high-tech context will address the context of emerging economies as well as cohesion regions and "no frills" niches in industrialised societies. The potential for competitiveness and job creation should be evaluated.

Type of action: Public procurement; up to 2 contracts with duration of up to 12 months.

Timeframe: Second and third quarter of 2014.

Indicative budget: EUR 200 000 from the 2014 budget

e) Intelligent Manufacturing Systems Secretariat

The LEIT part of Horizon 2020 will support the IMS secretariat for an amount of EUR 150 000 in 2014, and EUR 150 000 in 2015.

Type of action: Subscriptions

Timeframe: 2014 and 2015.

Indicative budget: EUR 150 000 from the 2014 budget and EUR 150 000 from the 2015 budget.

3. Inducement Prize

a) Inducement prize for the development of new materials and materials-based creative solutions by upstream collaboration between material scientists and designers[69]

Inducement prizes stimulate new and innovative solutions to address the existing and emerging societal challenges that are otherwise rarely pursued via normal grants and business processes in enterprises. Prizes in the key area of materials and creative industry, to boost the upstream collaboration between material scientists and designers, will be awarded on the basis of a contest once a pre-defined, ambitious yet feasible target has been reached. The specific rules of the contest are subject to the outcome of an on-going study for the development and design of an inducement prize in the key area of materials and creative industries under Horizon 2020. The specific rules of the contest will be published in 2015.

Type of action: Inducement prizes

Date of publication of the contest: 2015

Indicative budget: EUR 4 000 000 from the 2015 budget

[69] The exact approach to contest procedures is under development.

Budget

Calls	**2014**[70] **Budget EUR million**[71]	*2015*[72] *Budget EUR million*
Call H2020-NMP 2014/2015 Nanotechnologies, Advanced Materials and Production	230.70 *from 08.020201*	*254.00*
Call H2020-BIOTEC-2014/15 Biotechnologies	51.70 *from 08.020201*	*32.00*
Call H2020-FoF-2014/2015 Factories of the Future	82.00[73] *from 08.020201*	*77.00*[74]
Call H2020-EeB-2014/2015 Energy-efficient Buildings	49.50 *from 08.020201*	*64.00*
Call H2020-SPIRE-2014/2015 Sustainable Process Industries (SPIRE)	60.30 *from 08.020201*	*77.00*
Contribution from this part to call 'H2020-WASTE-2014/2015' (under Part 12 of the work programme)	5.00 *from 08.020201*	
Contribution from this part to call 'H2020-ICT-2014/2015' (under Part 5i of the work programme)	9.00 *from 08.020201*	
Other Actions	**2014**[75] **Budget EUR million**[76]	*2015*[77] *Budget EUR million*

[70] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary ~~a~~authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[71] The budget figures given in this table are rounded to two decimal places.

[72] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

[73] To which EUR 34 million from the ICT part of Leadership in Enabling and Industrial Technologies (budget line 09.040201) will be added making a total of EUR 116.00 million for this call.

[74] To which EUR 68 million from the ICT part of Leadership in Enabling and Industrial Technologies (budget line 09.040201) will be added making a total of EUR 145.00 million for this call.

[75] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary ~~a~~authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[76] The budget figures given in this table are rounded to two decimal places.

[77] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.

Experts (expert evaluators, experts groups, monitors)	2.20 *from 08.020201*	*2.20*
Public procurement – Project Technical Assistants and Exploitation Strategy and Innovation Consultants	4.15 *from 08.020201*	*4.35*
Public procurement – Nanotechnology monitoring and Studies	1.20 *from 08.020201*	
Subscription – IMS	0.15 *from 08.020201*	*0.15*
Inducement Prize	-	*4.00*

Horizontal activities (08.020201)	**2014**[78] **Budget EUR million**[79]	*2015*[80] *Budget EUR million*
Dissemination activities (see Part 17 of the work programme)	0.43 *from 08.020201*	
Corporate communication (see Part 17 of the work programme)	0.23 *from 08.020201*	
Estimated total budget	**496.56**	*514.70*

[78] Subject to the availability of the appropriations provided for in the draft budget for 2014 after the adoption of the budget for 2014 by the budgetary ~~a~~authority or if the budget is not adopted as provided for in the system of provisional twelfths.

[79] The budget figures given in this table are rounded to two decimal places.

[80] The budget amounts are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2015.