

EFFICIENT AND DECARBONIZED ENERGY SYSTEM

SEED

CALL FOR PROPOSALS TITLE

2012 Edition

Call for proposals closing date
March, 23rd 2012 at 1:00 p.m. Paris local time

Call for proposals publication address
<http://www.agence-nationale-recherche.fr/SEED-2012>

KEYWORDS

Energy efficiency, sustainable energy, industrial systems, energy chains, life cycle analyses, building components, thermal energy, waste heat, heat transport, thermal energy storage, CO₂ capture, post combustion, oxy-combustion, pre-combustion, CO₂ storage, geological storage, CO₂ valorization, CO₂ mineralization
supercritical CO₂, refrigerants

IMPORTANT DATES

CLOSING OF THE CALL FOR PROPOSALS

The project proposals must be submitted on the ANR submission web site - see address in link on page 1 - before the call for proposals closing deadline:

ON MARCH 23TH 2012 AT 1:00 P.M. (PARIS LOCAL TIME)

(see § 5 "Submission conditions")

SIGNED AND SCANNED DOCUMENT

Each partner must confirm participation in the proposal by signing its administrative and financial document. This document is generated from the ANR submission site after closure of the call for proposals. Once scanned in PDF format, the coordinator must upload all the signed administrative and financial documents to the submission web site no later than:

on April 16th 2012 at 1:00 p.m. (Paris local time)

(see § 5 "Submission conditions")

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It is important to read carefully the present document in its entirety, and the regulations concerning the conditions of allocation of ANR funding (<http://www.agence-nationale-recherche.fr/documents/uploaded/2007/reglement-modalites-attribution-aide.pdf>) before submitting a research project proposal.

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1. CONTEXT AND OBJECTIVES OF THE CALL FOR PROPOSALS

1.1. CONTEXT

The energy-climate package, adopted by the European Union, sets an objective of improving energy efficiency and cutting CO₂ emissions by 20% by 2020.

The International Energy Agency (IEA) produced scenarios demonstrating that the greatest potential in terms of reducing greenhouse gases by 2030 lies in energy efficiency measures in electricity demand (29%) and increased efficiency in the combustion of fossil carbon (36%). The IEA Blue Map scenario concludes that by 2050, CO₂ capture and storage (CCS) must make a 20% contribution to efforts to halve global CO₂ emissions, thus making it possible to reach this goal at a lower cost.

The final energy consumption in France is close to 160 MTep/year. The industrial sector currently represents 23% of this consumption, 70% of which covers heat requirements (boilers, furnaces, drying/heating systems, etc.); the building sector represents nearly 43% of this figure, 75% of which for heating requirements. It should also be noted that today, in France, CO₂ emissions are close to 380 Mt; the industrial sector (including energy production) accounts for 41% of this figure, and residential and tertiary buildings account for 24%.

In this context, the Grenelle Environment Forum has set particularly ambitious goals:

- Increase energy efficiency, with a view to limiting national final energy consumption to 167 MTep/year by 2020, including a reduction of building energy consumption by a 2:4 ratio;
- Reduce GHG emissions by 75% by 2050, in line with IPCC recommendations; i.e. a reduction of 31 Mt CO₂/year for the industrial sector and 55 Mt CO₂/year for the residential and tertiary sectors.

These challenges need to be placed in context: energy costs (and the future development thereof) and the dependence on external sources they entail for all economic players in France. Fossil energy resources are limited, with many of them located in sensitive geopolitical regions, sparking fears that future costs may rise considerably, or even soar. It is very much in the interest of fossil energy-dependent industries to make investments to become less dependent if they are to survive over the long-term. France's external energy bills would thus also be reduced.

These objectives lead to rethinking energy efficiency, particularly on the scale of industrial production systems, buildings and urban systems. They can also be used as a vital lever to ensure reduced consumption of natural resources. CCS represents set of complementary technologies that should make it possible to continue using fossil fuels whilst eradicating CO₂ emissions, thus ensuring an energy transition to a decarbonized economy.

1.2. PROGRAMME OBJECTIVES

The SEED programme aims to improve the overall energy efficiency of primary energy production units (excluding renewable, nuclear and bio-energies) and of industrial systems and building components; at the same time, it aims to reduce the ecological footprint of the adopted solutions. Particular attention is placed on recovering, and storing, low-temperature waste heat, which represents three quarters of all heat sources released by the industrial sector. It also aims to further develop, reduce costs and increase safety of CO₂ capture and storage technologies, and to explore CO₂ valorisation pathways. Research will focus on the development of innovative components, or on integrated system-based approaches (coupling, cogeneration, cross-disciplinary aspects of the 'CO₂ capture, storage and valorisation' chain, etc.), including modelling and experimental aspects.

The expected results will focus on:

- Developing models to optimize energy efficiency in industry and agriculture, quantifying energy sources that may potentially be recovered and any associated tools;
 - Improving energy performances and costs of components in industrial energy chains, developing innovative components;
 - Improving and developing energy components for the building sector, particularly for very low energy buildings of the future;
 - Improving energy performances in terms of converting primary energy;
- Optimizing energy in industrial processes and their implementation;
- Developing low-GHG manufacturing processes, or processes that save water or raw materials;
 - Optimizing renewable energy chains, improving their competitiveness and their market-penetration potential, particularly in the low- and high-temperature thermodynamic solar sector;
 - Developing energy integration, by coupling different industrial users and/or users from the residential/tertiary sector, in an integrated 'energy cascade' approach;
 - Reusing low-temperature energies;
 - Developing heat storage concepts for the building (inter-seasonal storage) and industry sectors, as well as for electricity production;
 - Reducing costs, energy consumption and environmental impacts of CO₂ capture processes;
 - Developing tools and methods for efficient and safe CO₂ storage in deep geological formations;
 - Exploring new methods of reusing CO₂, in addition to geological storage.

The programme also aims to strengthen the position of French academic research in the field of energy efficiency and decarbonized energy, and to encourage the creation of public-private sector partnerships.

1.3. CALL FOR PROPOSALS OBJECTIVES

The SEED programme tackles problems related to energy efficiency and CO₂ emissions reduction for all energy systems. However, it should be noted that:

- The problem of automotive systems including motorization is addressed in the "Sustainable Transport and Mobility" (Transports Durables et Mobilité) programme
- Since the global optimization of buildings and the management of urban systems is covered by the "Buildings and Sustainable Towns" programme, only the development of energy equipment for the building sector is taken into account in the SEED programme;
- The direct production of electricity using renewable energies, electrical components and systems, as well as electricity storage (except compressed air) are covered by the PROGELEC programme; thermodynamic solar aspects (particularly concentrated solar power) are covered by the SEED programme, as for compressed air electricity storage (CAES);
- Issues related to the development of decarbonized energy production from biomass, as well as the valorization of CO₂ in a photo-bioreactor for biomass growth are covered by the Bio-ME programme; chemical upgrading of CO₂ is covered by the CD2I programme;
- Projects addressing mainly socio-economic or public acceptability issues are taken into account in the INNOVATIVE SOCIETIES programme.

This programme is complementary to the TOTAL ADEME programme dedicated to energy efficiency in industry and to the ADEME 2011-2012 R&D programme into CO₂ geological storage, which is oriented towards marketing innovative monitoring and remediation technologies. It tackles several subjects covered in the European Union 2012 work programme (often upstream): concentrated solar electricity production or low temperature source solar power, thermal solar power, heat pumps, CO₂ capture or storage pilot tests, impact of impurities on CO₂ transport and storage.

N.B.: It should be remembered that a Call for Proposals provides a framework for requirements and that the proposed research objectives are in no way exhaustive. On the contrary, Call for Proposals fully support inventiveness and creativity from the bidders. Proposals relating to issues for which there are multiple or ill-defined themes are perfectly admissible, as are those that are positioned between several Call for Proposals (on condition that valid reasons can be cited for their submission to the SEED programme). In 'sensitive' cases, bidders are invited to contact the Scientific Task Manager or the Programme Manager. The programme is open to any international cooperation, particularly from the CCS field, with a view to pooling research efforts that are still required to promote and implement CCS technologies throughout the world.

In conjunction with Canadian research entities, the ANR's "Blanc International II" Call for Proposals, launched on 16 December 2011, provides funding options for bilateral CCS projects with public-private partnerships (<http://www.agence-nationale-recherche.fr/Blanc-Intl-2-2012>). CCS falls within the scope of themes selected in the agreement signed between the ANR and the Natural Sciences and Engineering Research Council (NSERC) in Canada.

2. THEMATIC LINES

2.1. THEMATIC LINE 1: EFFICIENCY AND SUSTAINABILITY OF ENERGY SYSTEMS

The efficiency of energy chains and components must be systematically assessed and justified in terms of analysis of the entire life cycle, with a view to avoiding pollution transfers or consumption of non-renewable energy sources. Similarly, it is important to integrate the notion of "final cost" (whenever required by the proposal).

SUBTOPIC 1.1: QUANTIFYING POTENTIALLY REUSABLE ENERGY SOURCES AND ANY ASSOCIATED TOOLS

This sub-theme groups together themes aiming to assess reusable lost energy sources, particularly in industrial sectors, as well those aiming to develop specific software and integrated methodological tools used to quantify and analyse these sources and suggest remedies for them. The space and time dimensions to be taken into account may vary, from the scale of an isolated industrial component to global analyses representative of a more complex system or a larger area (region). It may then integrate heat exchange and lost energy networks, the optimization of industrial processes and the minimization of pollutants, GHGs and water resources. In this context, it may use existing data bases and experience feedback. Issues related to the integration of technical-economic and socio-economic dimensions are also covered by this sub-theme, as is the optimization, implementation and control of systems using measurement channels, sensors and the creation of I&C systems adapted to the optimal use of energy.

SUBTOPIC 1.2: ENERGY EFFICIENCY OF ENERGY CHAIN COMPONENTS

This sub-theme aims to innovate or improve the design of individual components in energy chains in their broadest sense, in terms of energy, water consumption or GHG/pollutant release. The benefits must be justified for the entire life cycle.

A few non-exhaustive examples :

- Electricity and electricity production: variable speed drives, reciprocating engines with external heat supply, Stirling motors, turbines and microturbines, cogeneration and micro-cogeneration, organic Rankine cycles, high-performance electromechanical conversion components, high-power electronic components and converters, lighting components, induction and microwaves (if justified), self-diagnosis, etc.;
- Thermal lines: high-energy equipment, thermal transfer equipment, rapid or focalized furnaces, low-power hypercritical boilers, machines with three heat source cycles, cooling, optimized management, etc.
- Building equipment: development of domestic hot water production systems, heating and cooling systems, ventilation systems adapted to requirements in new low-energy buildings or renovated buildings, development and integration of renewable energies (thermal solar power, geothermal energy, biomass, etc.) or combined sources with a view to achieving energy autonomy, controllable devices and optimization of equipment control, etc.

SUBTOPIC 1.3: INCREASING THE EFFICIENCY OF ENERGY SYSTEMS

This sub-theme brings together proposals aiming to optimize energy processes and systems, as well as their implementation and control, by applying an integrated approach, excluding any buildings covered in the "Sustainable towns and buildings" project.

Improvements in terms of energy efficiency, CO₂ and pollutant release and in terms of minimizing water consumption must be justified through an approach based on the systems' life cycles. In addition to direct energy production (excluding nuclear), this concerns all high-energy activities, such as glass and cement production, the steel industry, oil refineries, sea water desalination, as well as the integration of industrial and/or service activities within an energy-efficient mindset, including better use of resources or reduction of GHG through the electrification of processes (when required). It also concerns adapting energy systems to new constraints, such as increasing production flexibility in line with the variable costs of electricity from renewable sources.

Similarly, optimizing logistics (considered independently or integrated into production optimisation), offers a myriad of possibilities to reduce fossil fuel consumption and CO₂ release through, for example, reduced distances travelled by distribution transporters of intermediate or finished industrial products.

The scope of this sub-theme covers improving the energy efficiency of thermodynamic renewable energy chains, particularly concentrated solar power.

2.2. THEMATIC LINE 2: TRANSPORT, STORAGE AND RE-USE OF HEAT ENERGY

Heat, and more specifically low-level heat released by the industrial sector, represents the main energy source that could be potentially recovered and re-used.

But heat may also have solar origins. This theme aims to use innovation to improve the transfer, transport and storage of heat energy, with a view to implementing its final use in the building or industrial sectors. It also takes account of the storage aspects for pneumatic or thermal electricity. The issue of newly designed materials (super-insulating, thermo electrical, phase change materials, etc.) are more specifically covered by the scope of the Materials and Processes programme.

SUBTOPIC 2.1: TRANSPORT AND RE-USE OF HEAT ENERGY

Low-level heat released by industry is particularly difficult to be re-used, as well through transportation to consumption locations, as through, low transformation efficiency levels. This sub-theme takes account of technologies used to reduce transport costs, possibly after thermochemical transformation, transmission onto grids, polygeneration, heat pumps used to increase the thermal level, electricity produced at low-levels, etc.

SUBTOPIC 2.2: THERMAL STORAGE

Storage of heat (or cold) is a crucial issue for energy efficiency and for the reduction of GHG release in the residential and industrial sectors. In the form of sensible heat (particularly underground), phase change or sorption materials, thermal storage can make possible to recover heat, including from thermal solar energy available in the summer, and to use it on

adapted time scales (i.e. inter-seasonal time scales). It can also make significant contributions to electricity storage.

This sub-theme also covers Compressed Air Energy Storage, especially the issue of Adiabatic CAES, the storage systems associated to concentrated solar power plants, or any electricity thermal storage.

2.3. THEMATIC LINE 3: CAPTURE, STORAGE AND VALORIZATION OF CO₂

This theme is devoted to the development of technology to massively reduce CO₂ emissions by capturing it at industrial systems level, followed by its permanent storage in geological formations. It also aims to explore innovative routes towards new methods for valorizing captured CO₂, without transformation or by mineralisation. Account must be taken not only of the scientific and technical issues, but also economic aspects (volumes processed, costs, etc., to secure economic viability over the long-term), as well as environmental and safety issues, by taking advantage of the data acquired in the pilots and demonstrators. Issues regarding the integration of these new sectors into society fall within the scope of the cross-disciplinary programme "Innovative Societies". The objectives to be met are in line with those set out by the European technological platform ZEP (Zero Emissions Platform) and the national ADEME road map.

SUBTOPIC 3.1: CO₂ CAPTURE

CO₂ capture technologies are well adapted to large and localized emissions by industry. Improving their energy efficiency and reducing the cost of CO₂ savings, as well as keeping their ecological impact to a minimum are crucial to their industrial implementation. All conventional or innovative capture technologies are eligible: pre-combustion, oxy-combustion, including oxygen production, particularly through chemical looping, post-combustion, membrane technologies, adaptation to specific industrial processes such as steelworks, cement works, etc. The flexibility of capture technologies when implemented in power plants with intermittent operating conditions is also an to be developed.

CO₂ purification - compression is an important and expensive step in investment and energy that it is also important to take into account.

SUBTOPIC 3.2: CO₂ STORAGE

The preferred solution is underground storage at depths of more than 800 m, making it possible to store large quantities of CO₂ in a dense form. The main targets, listed in order of priority are deep saline aquifers, which provide the greatest storage capacities, and depleted hydrocarbon fields. Innovative methodologies and technologies must be developed to facilitate storage sites characterisation and qualification, to optimize the injection operations, to ensure the site behaves correctly over the long-term and to guarantee safety and a negligible impact on the local environment.

Other types of alternative geological formations (coal, basalts, etc.) could lead to new opportunities.

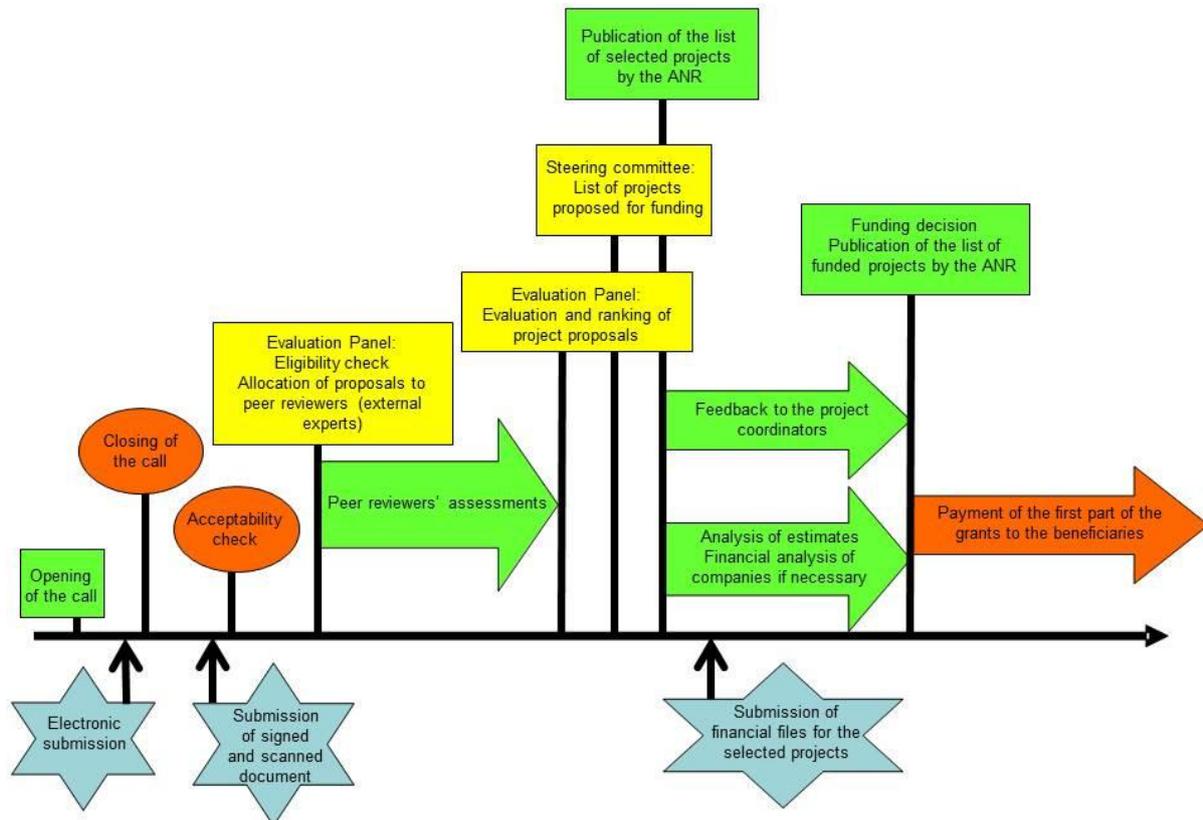
SUBTOPIC 3.3: VALORIZATION OF CO₂

Today industrial uses for CO₂ are very limited. In 2008, they represented just 0.5% of man-made emissions throughout the globe. Rupture technologies are required to find new applications, either through direct use, or by using CO₂ as a reagent or a carbon source (that would enable a move from petrochemistry towards carbochemistry). The research themes targeted in this Call for Proposals are limited to the valorisation, without transformation or by mineralization, of the CO₂ captured at various industrial sources. Valorization through biological transformation (microalgues, biocatalysis) is covered by the scope of the Bio-ME programme and valorization through chemical transformation into high-added-value products is covered in the CD2I programme.

SUBTOPIC 3.4: TRANSVERSE ASPECTS ACROSS THE WHOLE VALUE CHAIN

Good integration over the whole capture-transport-storage-valorization value chain is essential to develop this technological pathway. Examples of the main research themes are deployment scenarios, life cycle analyses, logistics optimization throughout the entire chain and accidentology, etc.

3. EXAMINATION OF PROPOSALS



The selection procedure involves the following steps:

- Examination of the **acceptability** of the proposals by the ANR in accordance with the criteria stipulated in § 3.1.
- Examination of the **eligibility** of the project proposals by the evaluation panel in accordance with the criteria stipulated in § 3.2.
- Peer reviewers (external experts) are appointed by the evaluation panel.
- Peer reviewers issue their assessments based on the evaluation criteria specified in § 3.3.
- The evaluation panel reviews research proposals upon reception of the peer reviewers' assessments, and drafts a scientific evaluation report.
- Examination of the project proposals by the steering committee, which proposes a list of projects to be proposed for funding by the ANR.
- Publication of the list of projects selected by the ANR (main list and possibly reserve list) on the ANR web site dedicated to the call for proposals.
- Sending the coordinators of projects a consolidated panel evaluation report.
- Finalising of the scientific, financial and administrative files for the selected projects.
- Publication of the list of projects selected for funding on the ANR web site dedicated to the call for proposals.

- First payments to the beneficiaries in accordance with the rules set in the regulations pertaining to the conditions of allocation of ANR funding (see link on ANR web site given on page 2).

The respective roles of the principal actors of the selection procedure are as follows:

- The peer reviewers (external experts) designated by the evaluation panel issue a written assessment for all proposed projects. Each project is reviewed by at least two experts.
- The evaluation panel comprising members of the research communities concerned, whether French or foreign, whose fields of expertise correspond to the requirements of the call and from the public or private sectors. The evaluation panel is mandated to evaluate the projects on the basis of the external experts' assessments, and to rank them into three categories: A (priority), B (non-priority), and C (rejected).
- The role of the steering committee, which comprises qualified prominent figures and institutional representatives, is to propose a list of projects to be funded by the ANR in accordance with the work of the evaluation panel.

The persons involved in project selection undertake to comply with the provisions of the ANR's code of ethics, and in particular the rules pertaining to the confidentiality and conflict of interest. The ANR code of ethics is available on the ANR web site¹.

The operational and organisational procedures that apply to evaluation panels and steering committees are stated in documents available on the ANR web site¹.

Once the list of selected projects has been published, the compositions of the evaluation panels are available on the ANR web site².

¹ <http://www.agence-nationale-recherche.fr/DocumentsAgence>

² <http://www.agence-nationale-recherche.fr/Comites>

3.1. ACCEPTABILITY CRITERIA

IMPORTANT

Project proposals that do not meet the acceptability criteria will not be submitted to the evaluation panel and will not be granted ANR funding under any circumstances.

- 1) The project proposal must be submitted **duly completed within the deadline**, and produced **in the format requested** (see submission conditions in § 5).
- 2) **The scientific document** respecting the layout and typography provided by the ANR **must not exceed 40 pages**.
- 3) The project **coordinator** must not be a member of the evaluation panel or the programme steering committee.
- 4) The project **duration** must be between 24 months and 48 months.
- 5) **Minimum number of partners** (including the coordinating partner): 2

3.2. ELIGIBILITY CRITERIA

IMPORTANT

Project proposals that do not meet the eligibility criteria after examination by the evaluation panel will not be granted ANR funding under any circumstances.

- 1) The project proposal must not be identical to a proposal already submitted to another ANR programme with the same year of edition, after examination by the evaluation panel. **(new criterion 2012)**
- 2) The project proposal must not infringe an intellectual property right constituting a counterfeit in the meaning of the intellectual property (or « plagiarism »), after examination by the evaluation panel. **(new criterion 2012)**
- 3) The project must **enter into the scope** of the call for proposals described in § 2.
- 4) **Type of research:** this call for proposals is open to:
 - Fundamental research projects³;
 - Industrial research projects³;
- 5) **Consortium composition:**
This call for proposals is open to collaborative research projects and research projects partnership research organization / company. The consortium must include at least two

³ See definitions of research categories in § 6.4.

partners, including at least one belongs to the class research organization (University, EPST, EPIC, ...).

3.3. EVALUATION CRITERIA

IMPORTANT

Only project proposals that satisfy the acceptability and eligibility criteria will be fully evaluated according to the criteria specified below.

- 1) Relevance of the proposal with respect to the call for proposals orientations**
 - suitability with respect to the thematic lines of the call for proposals (cf. § 2),
 - suitability with respect to the recommendations of the call for proposals (cf. § 3.5).
- 2) Scientific and technical quality**
 - scientific excellence in terms of progress of knowledge with respect to the state of the art,
 - innovative character in terms of technological innovation or prospects of innovation with respect to the existing situation,
 - overcoming technological barriers,
 - integration of the different disciplinary fields.
- 3) Methodology, quality of project construction and coordination**
 - positioning with respect to the state of the art or technological innovation,
 - scientific and technical feasibility of the project, choice of methods,
 - structuring of the project, rigour in presenting the final results (deliverables), identification of milestones,
 - quality of the management plan (experience, project financial and legal management), involvement of the coordinator,
 - strategy for the exploitation of the potential project results.
- 4) Overall impact of the project**
 - potential for utilization or integration of the project results by the scientific or industrial community or society, and impact of the project in terms of knowledge acquisition,
 - industrial or technological application prospects and economic and commercial potential, business plan, integration in the industrial activity. Credibility of the stated way of using the results,
 - benefit for society, public health, etc.
 - when appropriate, the response to questions of environmental impact.
 - actions to promote scientific and technical culture and communication (**new criterion 2012**),
 - actions to disseminate scientific results in higher education (**new criterion 2012**).
- 5) Quality of the consortium**
 - level of scientific excellence or expertise of the teams,
 - appropriateness of the partnership for the scientific and technical objectives,

- complementarity of the partnership,
 - openness to new players,
 - active role of the private partners in the project.
- 6) Appropriateness of project resources / Project feasibility**
- schedule feasibility,
 - appropriateness of the project management means implemented,
 - appropriateness and justification of the requested funding,
 - appropriateness of the coordination costs,
 - justification of the personnel resources,
 - justification of the temporary personnel resources (trainees, PhD students, post-doctoral students),
 - proper estimate of the sum for investments and equipment purchases,
 - proper estimate of the other financial items (missions, subcontracting, consumables, etc.).

3.4. SELECTION CRITERIA

The programme steering committee will make the final ranking of the proposals proposed by the evaluation panel. The main discussion points used by the committee to make the ranking will be:

- Does the project contribute to the strategy of the programme?
- Does the project contribute to the enrichment of an industrial sector?
- What is the risk taking / value (valorization potential)?
- Socio-economic opportunities: a strong contribution to public policies priority, the economic valorization prospect, strengthening the competitiveness ...

3.5. IMPORTANT RECOMMENDATIONS

Any divergence from these recommendations is not necessary penalizing but must be clearly explained.

The evaluation panel will judge the appropriateness of the divergence from the recommendations.

RECOMMENDATION CONCERNING PERSONNEL INVOLVEMENT

- The project proposals shall ensure a balance between permanent personnel and temporary personnel, as indicated in §4.
- The funding of each post-doc should not be inferior to a duration of 12 months.

RECOMMENDATION CONCERNING THE REQUEST FOR ANR FUNDING

- In the framework of this call for proposals, applicants are invited to present projects justifying ANR funding to a level between 800 k€ and 1000 k€. This recommendation does not exclude the possibility that projects can be funded for amounts either below or above the range.

RECOMMENDATION CONCERNING "FOLLOW-UP" PROJECTS

- Project proposals following on from previous project(s) financed by the ANR shall include a detailed report of the results obtained and clearly describe the new problems posed and the new objectives.

RECOMMENDATION CONCERNING PROJECTS INVOLVING FOREIGN PARTNERS WITHOUT A PRIOR BILATERAL AGREEMENT SIGNED BETWEEN THE ANR AND A FOREIGN FUNDING AGENCY

The foreign partner must ensure his/her own financing and explicit in the scientific and technical proposal:

- Whether the activities are carried out with already existing funds and justify
- Whether the foreign partner has already received national funding for its contribution to the proposed project
- If not, indicate whether he/she requested a national funding for his/her participation in the project by sending out the same scientific proposal to a funding organisation of his/her country. In that case provide the complete details of the funding organisation as well as the name, function, e-mail and phone number of the programme director in his/her country.

RECOMMENDATION CONCERNING THE ACTIONS OF SCIENTIFIC AND TECHNICAL CULTURE AND COMMUNICATION

- Actions of scientific and technical culture and communication are eligible, but a clear link with the project must be demonstrated and the impact of such actions must be ambitious, specifying targeted audiences (e.g. media, youth, working people, teaching professionals, etc.). For the construction of the project, it is recommended to associate scientific communication/mediation professionals to those actions (communication department of research organisations and companies, operators of scientific culture, etc.). The budget allocated to these tasks should not exceed 8 to 10% of the funding request.
- As part of a research project, those actions will be evaluated as an element of the global impact of the project (criterion n°4, see above).
- For further information on integrating actions of scientific culture and communication, please consult ANR web page on the topic.

RECOMMENDATIONS CONCERNING THE ACTIONS SUPPORTING HIGHER EDUCATION

- The contribution of a project to the content of higher education trainings may reinforce the impact of such a project, e.g. supporting the integration of current research themes into the teaching. Projects funded by the ANR can integrate this approach into their work programme. The actions proposed must have a direct link with the content of the project. They can take diverse forms, e.g. constructing a web site, designing and developing original educational tools based on research material; educational conferences, etc.). The budget devoted to these tasks should not exceed 8 to 10% of the funding request.
- As part of a research project, those actions will be evaluated as an element of the global impact of the project (criterion n°4, see above).

4. PARTICULAR FUNDING PROVISIONS

This section complements the general provisions set forth in §6.1

CONDITIONS FOR FINANCING TEMPORARY PERSONNEL

Temporary personnel (trainees, post-doctoral students, fixed-term contract employees, temporary employees, etc.) may be assigned to projects in this programme. Except for special cases, the manpower (in person months) funded by the ANR for the project as a whole should not exceed 50% of the total manpower engaged in the project.

RECRUITING PHD SCHOLARSHIPS

For this program, Ph.D. students may be funded by the ANR. Funding for Ph.D. students by the ANR in no way prejudices the agreement of the graduate school. Doctoral students are counted as temporary staff for the implementation of the "condition for the funding of temporary staff" above.

5. SUBMISSION CONDITIONS

5.1. CONTENT OF THE SUBMISSION FILE

The submission file, appendices excluded, must include all the elements necessary for the scientific and technical evaluation of the project. It must be completed before the submission deadline, the date and time of which are indicated on p. 2 of this call for proposals.

IMPORTANT

No additional elements will be accepted after the submission deadline, the date and time of which are indicated on p. 2 of this call for proposals.

The submission file comprises two documents that must be entirely filled out:

- a) The project "administrative and financial document". It is generated by the submission site after entering the required information on line.
- b) The "scientific document" is the scientific and technical description of the project. The document template is available in Word format on the ANR web site on the page dedicated to the call for proposals. Once completed, this document is to be uploaded to the submission site in the "Scientific document" tab. This document must not exceed 40 pages in the layout and typography provided by the ANR.

It is recommended to produce the scientific and technical description of the project proposal in English. In the case that the scientific and technical description is drawn up in French, a translation in English may be requested within a deadline compatible with the evaluation process.

5.2. SUBMISSION PROCEDURE

1) SUBMISSION SHALL BE MADE ON LINE ON THE DEDICATED SITE ACCESSIBLE FROM THE ANR WEB SITE AT THE ADDRESS INDICATED ON PAGE 1:

- before the date indicated on page 1,
- link available starting from <http://www.agence-nationale-recherche.fr/programmes-de-recherche/appel-detail/systemes-energetiques-efficaces-et-decarbones-seed-2012/> on the call for proposals publication page of the ANR web site.

The project can be modified right up until the call for proposals is closed.

Only the information present on the submission web site at the time of the closure of the call for proposals will be taken into account.

ANY FILE CONTAINING A SCIENTIFIC DOCUMENT AND A POSITIVE FUNDING REQUEST WHEN THE CALL CLOSES WILL BE CONSIDERED SUBMITTED, AND IN THIS CASE AN ELECTRONIC ACKNOWLEDGEMENT OF RECEIPT WILL BE SENT TO THE COORDINATOR.

2) SCAN TRANSMISSION (in PDF format) of the administrative and financial document.

This document is generated by the submission site after entering the required information on line.

This document is to be downloaded from the submission site, printed, signed by all the French partners, then scanned (in PDF format) and uploaded to the ANR submission site by the French project coordinator no later than the date indicated on page 2.

Reminder: the scientific representative and the direction (or any person authorized to sign on behalf of the organisation) of each public organisation or research foundation that is partner in a project **must sign** the administrative and financial document. For the other partners, only the legal representative must sign this document.

5.3. SUBMISSION RECOMMENDATIONS

It is strongly recommended:

- Not to wait until the submission deadline to submit the project;
- To start on-line entry of the administrative and financial data at the latest one week before the closing date of the call for proposals. For information only, below is a non-exhaustive list of the data to be provided:
 - full name, abbreviation and category of partner
 - calculation of the basis of the funding request
 - belonging to a Carnot institute

- for a laboratory of a public research organisation: type and number of unit, managing and housing supervising organisation
- for a company: SIRET number and staff (for SMEs)
- work location address
- funding request: exclusive of VAT cost per month of permanent and non-permanent personnel, etc.
- ...
- To register the information entered on the submission site before leaving each page;
- To regularly consult the website dedicated to the programme at the address indicated on p. 2, which contains updated information concerning the applicable procedures (submission site user's guide, budget preparation guide, glossary, FAQs, etc.);
- To contact the project officers by electronic mail at the address(es) indicated on p. 2 of this call for proposals.

5.4. PARTICULAR SUBMISSION CONDITIONS FOR THE APPLICATION FOR LABELLING BY A COMPETITIVENESS CLUSTER⁴

The application for project labelling by one or more competitiveness clusters is made from the submission site using the following procedure:

- When submitting the project proposal, the partner can indicate the intention to request labelling by one or more competitiveness clusters in the clusters tab.
- A pre-filled application request form is automatically generated.
- An e-mail alert is sent to the competitiveness cluster(s) concerned. The cluster(s) must then download the form from the submission website.
- Once completed, dated and signed, the cluster must upload the scanned document (pdf format) on the submission website within a deadline of two months after the closing date of the call.

Project partners are requested to contact the cluster in parallel to the project submission procedure.

6. GENERAL PROVISIONS AND DEFINITIONS

6.1. ANR FUNDING

TYPE OF FUNDING

The funds allocated by the ANR to each partner will be provided as a non-refundable grant in accordance with the provisions of the "Regulations relative to conditions of allocating ANR funds", which can be consulted on the ANR web site⁵.

⁴ See additional provisions related to clusters in § 6.3

⁵ <http://www.agence-nationale-recherche.fr/documents/uploaded/2007/reglement-modalites-attribution-aide.pdf>

ANR funding is limited to project partners residing in France, the associated international laboratories of French research organisations and higher education and research institutions, and French institutions established abroad. Foreign partners may nevertheless participate on condition that each foreign partner ensures its own financing in the project.

IMPORTANT

The ANR will not allocate funding of less than €15,000 to a project partner.

FUNDING RATES FOR PRIVATE ENTERPRISES

The maximum ANR funding rates for private enterprises⁶ for this call for proposals are as follows:

| Type of research | Maximum funding rate for SMEs | Maximum funding rate for enterprises other than SMEs |
|-----------------------------------|-------------------------------|--|
| Fundamental research ⁷ | 45 % of eligible expenditure | 30 % of eligible expenditure |
| Industrial research | 45 %* of eligible expenditure | 30 % of eligible expenditure |

(*)For projects that do not involve a true collaboration between an enterprise and a research organisation, the maximum funding rate is 35%.

There is true collaboration between an enterprise and a research organisation when the research organisation underwrites at least 10% of the costs on which the funding request is based and when it retains the right to publish the results of the research, whenever these results are obtained from the organisation's own research efforts.

IMPORTANT

The incentive effect⁸ of allocating ANR funding to companies other than SMEs must be established. Consequently, non-SMEs selected for funding under this call will be asked to provide the information necessary to evaluate this aspect during the finalizing of the administrative and financial files.

⁶ See definitions relating to structures in § 6.6.

⁷ See definitions of research categories in § 6.4.

⁸ See definition of the incentive effect in § 6.7.

6.2. REGULATORY AND CONTRACTUAL OBLIGATIONS

CONSORTIUM AGREEMENTS

For public / private partnership projects involving a research organisation and a private enterprise the partners must conclude, under the supervision of the project coordinator, an agreement specifying:

- the distribution of the tasks, human and financial resources and deliverables;
- the sharing of the intellectual property rights linked to findings obtained within the framework of the project;
- the project start and end dates;
- the conditions of publication / dissemination of the results;
- the application and transfer of project findings.

These agreements shall enable the existence of any indirect financial support entering into the calculation of the maximum level of funding authorized under the European Community Framework for state aid for research and development and innovation (referred to hereinafter as the "EC Framework") to be determined.

It will be assumed that there is no indirect aid if at least one of the following conditions is satisfied:

- The beneficiary company, working within the EC Framework, underwrites all the project costs;
- where results cannot be protected by intellectual property rights, the beneficiary research organisation is free to use and disseminate its results;
- where results can be protected by intellectual property rights, the beneficiary research organisation retains ownership of these rights;
- the beneficiary company, working within the EC Framework, that benefits from a result developed by a beneficiary research organisation remunerates the latter in keeping with market conditions.

The project coordinator will send a copy of this agreement to the ANR along with a statement signed by the partners certifying the compatibility of the agreement with the provisions of the EC Framework and the convention(s) defining the conditions of project performance and financing. **The documents shall be sent within twelve months after the grant agreements come into force.**

The statement must therefore certify either that the consortium agreement fulfils one of the conditions listed above, or that all the intellectual property rights concerning the results and the rights of access to these results are allocated to the various partners in a way that reflects their respective interests and their level of participation in the project, including financial and other contributions. Failing this, the consortium agreement may be considered as a form of indirect funding, leading to a reduction in the percentage of direct funding allocated by the ANR.

SCIENTIFIC FOLLOW-UP OF PROJECTS

Funded projects will be scientifically monitored during their lifetime by the ANR, up to one year after the end of the project. Scientific follow-up consists of:

- intermediate progress reports (2 or 3 according to the project duration);
- a final report;
- the collection of impact data on the project;
- the participation to at least one intermediate assessment seminar;
- the participation to thematic symposia organised by the ANR (one or two participations).

Project proposals must take into consideration the corresponding costs in their work programme and in the project estimates.

MORAL RESPONSIBILITY

The funding of a project by the ANR does not relieve the project partners of their obligations concerning the regulations and code of ethics applicable to their area of activity.

The coordinator undertakes in the name of all the partners to keep the ANR informed of any change likely to modify the content, the partnership or the schedule of project performance between the time of project submission and publication of the list of selected projects.

6.3. ADDITIONAL PROVISIONS

COMPETITIVENESS CLUSTERS⁹

The partners of a project can have their project labelled by one or more competitiveness clusters. The labelling of a project by a cluster reflects the acknowledgement of the interest of the project with respect to the strategic orientations of the cluster.

As the project labelling application requires the disclosure of strategic, scientific and financial information to the cluster, the partner behind the labelling initiative is asked to obtain the agreement of the other project partners beforehand. In the ANR selection process, the steering committee is informed if a project has a cluster label.

If the project is financed by the ANR, the partners undertake to communicate the project intermediate and final reports to the competitiveness cluster. The ANR reserves the option of inviting representatives of the competitiveness cluster to attend any project reviews or follow-up and assessment operations.

The ANR may allocate additional funding to the partners of a labelled project¹⁰ if they are situated in the region(s) of the cluster(s) concerned, **and if the project is a public-private partnership involving at least a research organisation and a private company.**

If the partner is a company, this additional funding complements the initial project grant.

⁹ See definition of a competitiveness cluster in § 6.6

¹⁰ A project can be labelled by several clusters; in this case, the geographical perimeter considered will be that covered by all the clusters having labelled the project.

If the partner is a public research laboratory or a legal entity that is not subject to the EC Framework rules, this additional funding must be allocated to expenses that relate to the competitiveness cluster's activity (oversight and coordination, technological watch, project engineering, etc.)¹¹.

RESEARCH TAX CREDIT

The expenses incurred by companies to finance research work may be eligible for the research tax credit - see article 244 quater B of the general tax code.

The tax credit for projects selected by the ANR may be allocated to companies as additional funding on the basis of the part of the research budget that is not covered by ANR funding.

A prior opinion on the eligibility of the operation for the French research tax credit (called CIR) can be obtained by filing a request with the ANR for an advance tax ruling (prior agreement) - see article L80B3 bis of the "Livre des procédures fiscales" (French fiscal procedures book). To benefit from this provision, companies must choose the system provided for by article 3bis of article L80B (see paragraph 1 of the application form which can be downloaded from the following address):

<http://www.agence-nationale-recherche.fr/CIR>

The employees who examine the research tax credit (CIR) application files are held to professional secrecy, on the same account as the tax authority employees under the conditions provided for in article L103 of the "Livre des procédures fiscales" (French fiscal procedures book).

6.4. DEFINITIONS CONCERNING THE DIFFERENT RESEARCH CATEGORIES

These definitions figure in the EC Framework for state aids for research and development and innovation¹². The following meanings apply:

Fundamental research: "experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena or observable facts, without any direct practical application or use in view".

Industrial research: "the planned research or critical investigation aimed at the acquisition of new knowledge and skills for developing new products, processes or services or for bringing about a significant improvement in existing products, processes or services. It comprises the creation of components of complex systems, which is necessary for the industrial research,

¹¹ To learn more about the conditions of allocation and use of the additional funding, see: <http://www.agence-nationale-recherche.fr/parteneriats-public-privé/poles-de-compétitivité/regles-de-calcul-et-d-utilisation-du-complément-lie-au-label/>

¹² See JOUE 30/12/2006 C323/9-10

<http://www.agence-nationale-recherche.fr/documents/uploaded/2007/encadrement.pdf>

notably for generic technology validation, to the exclusion of prototypes covered [in the definition of experimental development] [...]".

Experimental development: "the acquiring, combining, shaping and using of existing scientific, technological, business and other relevant knowledge and skills for the purpose of producing plans and arrangements or designs for new, altered or improved products, processes or services. These may also include, for example, other activities aiming at the conceptual definition, planning and documentation of new products, processes and services. The activities may comprise producing drafts, drawings, plans and other documentation, provided that they are not intended for commercial use.

The development of commercially usable prototypes and pilot projects is also included where the prototype is necessarily the final commercial product and where it is too expensive to produce for it to be used only for demonstration and validation purposes. In case of a subsequent commercial use of demonstration or pilot projects, any revenue generated from such use must be deducted from the eligible costs.

The experimental production and testing of products, processes and services are also eligible, provided that these cannot be used or transformed to be used in industrial applications or commercially.

Experimental development does not include the routine or periodic changes made to products, production lines, manufacturing processes, existing services and other operations in progress, even if such changes may represent improvements."

6.5. DEFINITIONS CONCERNING PROJECT ORGANISATION

For each project, a single coordinating partner is designated, and each of the other partners designates a scientific and technical representative.

Coordinator: the person responsible for the scientific and technical coordination of the project, the setting up and formalizing of the collaboration between the partners, production of the project deliverables, holding of the progress meetings and communication of the results. The coordinator is the chief contact for the ANR. The partner to which the coordinator belongs is called the coordinating partner.

Partner: Unit of a research organisation or of an enterprise (see the definitions concerning the structures in §6.6) or another legal entity.

Coordinating partner: partner to which the coordinator belongs.

Scientific and technical representative: each partner appoints a scientific and technical representative who is the chief contact for the coordinator and is responsible for production of the partner's deliverables.

Public private partnership project: research project for which at least one of the partners is an enterprise and at least one of the partners belongs to a research organisation (see definitions in § 6.6 of this document).

6.6. DEFINITIONS CONCERNING THE STRUCTURES

Research organisation: "an entity, such as a university or research institute, irrespective of its legal status (organised under public or private law) or way of financing, whose primary goal is to conduct fundamental research, industrial research or experimental development and to disseminate their results by way of teaching, publication or technology transfer; all profits are reinvested in these activities, the dissemination of their results or teaching; undertakings that can exert influence upon such an entity in the quality of for example, shareholders or members, shall enjoy no preferential access to the research capacities of such an entity or to the research results generated by it¹³ .

Technical centres, save duly justified exceptions, are considered to be research organisations.

Enterprise: An enterprise is considered to be any entity engaged in an economic activity, irrespective of its legal form. This includes, in particular, self-employed persons and family businesses engaged in craft or other activities, and partnerships or associations regularly engaged in an economic activity¹⁴.

Small and medium-sized enterprise (SME): an enterprise that meets the European Commission's definition of an SME¹⁴. More particularly, an SME is an independent company which employs fewer than 250 persons and which have an annual turnover not exceeding EUR 50 million, and/or an annual balance sheet total not exceeding EUR 43 million.

Competitiveness cluster: A competitiveness cluster is an association of enterprises, research centres and training organisations, situated in a given geographical area and deploying a common development strategy with the aim of creating synergies around innovative projects conducted jointly and targeting one market or more¹⁵.

6.7. OTHER DEFINITIONS

Incentive effect: Having an incentive effect means, under the terms of the community provisions, that the aid induces the aid recipient to increase its R&D activities, by increasing their size, scope, amount spent or speed. The incentive effect shall be analysed by comparing a situation without aid a situation with aid being granted, using the answers to a questionnaire sent to the company. Various criteria may be used for this purpose: total

¹³ See Community framework for State aids for research, development and innovation, JOUE 30/12/2006 C323/9-11 (<http://www.agence-nationale-recherche.fr/documents/uploaded/2007/encadrement.pdf>)

¹⁴ See EC user guide on the definition of small and medium sized enterprises.

http://ec.europa.eu/enterprise/policies/sme/files/sme_definition/sme_user_guide_fr.pdf.

¹⁵ See <http://competitivite.gouv.fr/>

project costs, R&D personnel assigned to the project, scope of project, level of risk, increase in the risk of the work, increase in the company's R&D expenditure, etc.

Working time of researchers employed by a university: the percentage of working time of researchers employed by a university is based on the research time (considered at 100%). Thus a researcher employed by a university who devotes his/her entire research time to a project for one year will be considered to represent 12 person months. For the calculation of the full cost, however, the person's salary shall be counted at 50%.