

# Call for pre-proposals for *Clean Combustion Concepts*

### **The challenge**

This STW Perspectief program aims to support industry in the development and application of Clean Combustion Concepts (CCC's). CCC's are a set of new revolutionary combustion methods which combine very high efficiency with extremely low emissions of unwanted pollutants. Further development and application is considered to be essential to create a society with a sustainable energy supply.

Academic researchers are invited to submit pre-proposals. Aiming at a direct link between public research centres and the industrial world, CCC projects should have at least one industrial partner that participates substantially (cash and/or in-kind) in the research. The contributions of the industrial partners should add up to 25% of the total project costs if expressed in financial means.

### **Research topics**

Proposals on CCC's in all application areas of combustion are acceptable. Preferred application areas are engines, gas turbine combustors, process burners and furnaces. However, to reach the goals formulated above, submitted proposals within a restricted set of research topics are preferred. Key elements of the program are 'emissions', 'efficiency' and 'fuel flexibility'. The reason for this is that the technological challenge for the coming decennia will be to achieve maximum fuel efficiency (minimum CO<sub>2</sub>) with minimum pollutant emissions (NO<sub>x</sub>, CO, particles, etc.) in the entire range of energy-conversion processes. Furthermore, to make optimal use of sustainable fuels, such as biogas, new high-efficiency, low-emissions conversion methods must be developed for these fuels as well. Research projects containing one or more of these elements fit very well into the program.

Essential requirements for projects to be acceptable are that they must:

- be about combustion
- be relevant for practical application
- have results which are transferable to industry
- must deliver a substantial improvement compared to existing technology
- concern medium to long term development

Strong preference is given to projects which have several of the following characteristics:

- explore a genuinely new concept in combustion, excluding catalytic combustion

- focus on the combustion process rather than on other (related) processes or overall process schemes
- provide a way to reduce unwanted emissions
- contribute to higher fuel flexibility, including combustion of biofuels
- deliver a breakthrough in advanced measurement and/or computation of combustion processes

As there are other running programs stimulating research on biomass conversion (e.g. pretreatment, pyrolysis, non-thermal conversion, ...). The CCC program does not cover topics in this area. Research proposals related to the (fuel-rich) combustion of biomass or combustion of biomass-derived Fischer-Tropsch fuels are within the scope of the program though.

Studies of secondary features such as noise generation, fouling, air separation etc, by themselves do not fit directly into the program. Only when they appear as essential bottleneck of a proposed combustion concept they might fit in a project proposal.

### **Application fields**

The focus of this program is on new Clean Combustion Concepts (CCC's), revolutionary methods to produce energy from current and future fuels, with substantially enhanced efficiency and significantly reduced pollutant emissions. Examples of closely related emerging technologies for ultra-clean combustion are Premixed Charge Compression Ignition (PCCI) in engines, and High Efficiency Combustion (HEC) in gas turbines, furnaces and boilers. These concepts and similar ones such as "Controlled Auto-Ignition" (CAI), "Low-Temperature Combustion (LTC)" with high Exhaust Gas Recirculation (EGR) in engines, "High Temperature Air Combustion" (HiTAC), or "FLameless OXidation" (FLOX) in furnaces that have already been proposed should be brought to widespread application via the results of this program. On the other hand, proposals for other CCC's are invited for investigation in the program.

The sectors in the Dutch industry that will benefit from and intend to contribute to the research program are: petrochemical industry, metals industry, transport sector and electricity producers, boilers and furnace industry, gas industry, consumer electronics and SME. Besides the Dutch industry also research institutes such as TNO and ECN will benefit from the knowledge that is generated in this research program.

## Budget

For this call a budget of M€ 4.5 is available which must be matched by the contributions of potential technology users (companies/institutes) to a total of at least M€ 6. The maximum of project costs that can be requested from STW is € 750.000 per project. A contribution of potential "users" of at least 25% of the total project budget is compulsory and adds up to the requested amount.

The users do not have to co-finance up-front in the program but may contribute in-kind (materials, equipment, facilities etc.) and/or financially in the project wherein they will participate.

To realize the ambitions of the program a budget for conferences, workshops and events will be reserved on program level. This will be 5% of the funding made available by the STW board

## Who can apply

Scientists employed by Dutch universities or scientific institutes recognized by NWO are eligible to submit a (pre-)proposal (see OTP-guidelines for eligibility criteria). Since CCC is a multidisciplinary program, projects which involves two or more research groups with different backgrounds (e.g. mechanical engineering/chemical engineering, applied mathematics/physics) are preferred. In the project description it should be made clear what the added value of the multidisciplinary approach is for the project.

## Proposals and selection

The selection of proposals will be done in two steps: a call for pre-proposals and an invitation to the applicants of pre-proposals to submit full proposals. The pre-proposals will be evaluated by the program committee. The STW board will decide on the funding of the full proposals.

## Funding

Project grants will cover:

- personnel costs (including PhD, postdoc positions, positions for technical assistants)
- material costs (including national travel costs)
- international travel costs
- costs for equipment

The institution(s) of the applicant(s) ensure(s) the required infrastructure, the supervision and fitting into the research program of the research institute. STW may verify this with the dean or the executive board of the institute.

The expertise required for the research must be available at the requesting institute(s), so that external consultants will not be necessary. If one co-operates with institutes that cannot apply for CCC funds, for example TNO or a foreign university, these parties take care of their own funding.

## How to submit?

In order to minimize the time needed for writing and evaluating the proposals, it is compulsory to submit a

preliminary proposal. All pre-proposals must be written in accordance with the formal guidelines. Only pre-proposals written in English and in accordance with the guidelines will be accepted for evaluation. **Pre-proposals should be send by email to STW (info@stw.nl).** Pre-proposals should be submitted to STW **before Monday 21 April 2008, 24.00 hrs.** Pre-proposals submitted after this deadline will **not** be accepted.

## Pre-proposals

Pre-proposals should contain a short description (3 A4) of the proposed research, utilization paragraph and estimated budget. The proposal should make clear which potential users will contribute to the project. Support letters are optional for the pre-proposals but can be included (letters of intent are accepted). The pre-proposals will be ranked by the program committee on the basis of how well they fit within the scope of the program. The members of the program committee will first assess the pre-proposals individually before being discussed plenary in the committee. The program committee will advise the applicants 1) to submit a full proposal or 2) to adjust the proposal so that it would fit better into the program or 3) not to enter the subsequent selection procedure.

## Full proposals

Full proposals must consist of a detailed description of the expected results, planning of the research and a utilization paragraph. The utilization paragraph should include the important industrial challenges that will be solved, the time frame to implementation and the expected bottle-necks during the implementation. Companies and institutes, which will potentially contribute, should be involved bottom-up during the preparation of the proposal.

**A full proposal will be evaluated only if it is preceded by a pre-proposal.** The scientific quality and the utilization perspective of the full proposals will be evaluated individually by peer review. An independent jury of about eight (inter)national experts of universities and industry (applicants will be excluded) will rank the full proposals. Each jury member will give 3 marks for each proposal: one for scientific quality, one for utilization potential and one for the strategic fit within the program. The marks will be averaged with equal weight to one final score for the proposal which determines the ranking. In addition to the ranking by the jury the program committee will formulate an advice on the cohesion between the project proposals and their relevance for the program. The decision of the STW board will be based on the ranking by the jury and the advice of the program committee.

The guidelines for full proposals are based on the "Open Technology Program (OTP)" with as main difference that the potential technology users (companies/institutes) should contribute for at least 25% of the total project costs. The proposals should

therefore be accompanied by a 'letter of participation' in which the contribution has been made explicit and in which details are given on what, when and how these

contributions will be made available. For more details see "richtlijnen voor het open technologieprogramma" ([www.stw.nl](http://www.stw.nl)).

### **Time schedule CCC proposals**

Call for pre-proposals	Fri 7 March 2008
Deadline pre-proposals	Mon 21 April 2008, 24.00 hrs.
Notification to applicants pre-proposal: Positive/negative advice to submit full proposal	Tue 6 May 2008
Deadline full proposals	Mon 23 June 2008, 24.00 hrs.
Start review by experts	Mon 30 June 2008
Deadline protocol ready	Mon 15 Sept 2008
Ranking by jury ready	Mon 20 October 2008
Advice Program Committee to STW board ready	Wed 29 October 2008
Proposal for funding send to STW board	Fri 31 October 2008
Decision by STW board on funding + notification to applicants	Fri 7 November 2008

### **Appendices**

Annex 1: The pre-proposal

#### **For future reference only:**

Annex 2: The full proposal

Annex 3: Assessment and selection criteria

Annex 4: Assessment and selection procedure

Annex 5: Utilisation

Annex 6: Procedure after granting

## Annex 1

### The pre-proposal, deadline 7 April 2008, 24:00 hours

The project outline - which must not exceed 3 pages – should be written in English. The structure must be as follows:

- Mention on the front page 'Clean Combustion Concepts' in the upper left corner
- Title
- Names and addresses of the applicants
- Expertise of the applicants and the objectives to increase these expertise
- Fit within the topics of the program
- Spearheads of the project
- Concise description of the planned research. At least a description should be given of the expected results and the implementation thereof in industry
- Names and addresses of the industrial partners of the project, if possible the names of the contacts within the companies
- Support and involvement of the industrial project partners to this research project (qualitatively and quantitatively)
- Preliminary budget
- References.

Upon receiving a pre-proposal STW will decide on its admission (eligibility criteria). The program committee will assess the strategic fit within the research program and its topics. Each individual program committee member will give a mark for the strategic fit for each proposal. Then, in a plenary session the program committee will discuss all pre-proposals and formulate an advice to the applicants. This advice can be: 1) to submit a full proposal or 2) to adjust the proposal so that it would better fit into the program or 3) not to enter the subsequent selection procedure.

The program committee will evaluate the fit of the pre-proposals within the framework of the program and will use the following considerations:

- How well do the goals of the project fit within the ambition of the program. Do the expected results meet the industrial needs in the long term (2012-2016)?
- To what extent does the proposal fit within the research topics of the program?
- Does the program strengthen the Clean Combustion Concepts expertise in the Netherlands in general and of the participants in the project in particular?
- To which extent is the project proposal multidisciplinary? What are the positive effects from the interdisciplinary cooperation? How is interaction in between researchers and between university and industry organized?
- Do the proposals overlap each other and if so, what are the consequences for the funding?

## Annex 2

## Format of the full proposal *(for future reference only)*

STW receives your proposal by e-mail ([info@stw.nl](mailto:info@stw.nl)) in doc or pdf format.

- ◆ *Mention on the front page 'Clean Combustion Concepts' in the upper left corner*
- ◆ *The maximum length is approximately 12 (twelve) pages of A4*
- ◆ *The proposal and support letters must be written in English.*

### Administrative data

On maximally half a page you should provide:

- ◆ Title. The title of the project has a maximum of 225 characters. For publicity purposes, a short, non-technical title or acronym is required as well.
- ◆ Name, address, phone number, fax number and e-mail address of the applicants and possible co-applicants and the telephone number of the secretary.
- ◆ STW sends the official correspondence to the main applicant. This is the first applicant mentioned. STW assumes the main applicant will have the supervision on the project. He or she becomes the project leader and bears the final responsibility for the execution of the research and the utilization plan.
- ◆ Applications elsewhere. If support has been applied for elsewhere, you should give the status of this application at the time of submission.

### Project description

#### 1. Summaries

The summaries should be clear to those active in the field.

##### Research summary

Summarize in half a page the context, problem statement, research method and expected results.

##### Utilization summary

Summarize the utilization potential of the expected results in half a page. Provide everything the reviewers should know about the utilization: the chosen approach, the chosen partners and the way results will be brought into practice.

#### 2. Composition of the group

##### The current group

Describe in half a page the composition of the team (academic and industrial) that will perform the research as well as the reason this team is fit for this research. Indicate the supervisors of the project, the proposed staff, and how the tasks will be divided.

##### Available infrastructure

This information includes available laboratory room and equipment.

##### Candidate researchers

In case candidates for the proposed staff positions are already known, you mention them here. Give a short explanation of their suitability.

#### 3. Scientific description

In this section of maximally four pages an expert in the field should find all information to assess the quality of the proposed research. Treat the following subjects:

## **Contents of the research**

Provide the scientific objectives, the starting-points and the substance of the project. Describe the methods and techniques you will apply, the available knowledge in the team, the knowledge to be developed, and the instruments and models you will use for this. In-kind support of potential users must be an integral part of the research project.

## **Required personnel and equipment**

Provide motivations for staff and equipment and possible other requirements for the research.

## **Time schedule and allocation of tasks**

Describe the proposed course of the research over the years and how the different parts must interact. You give decision points (milestones) and moments research results are expected (deliverables). Further, you indicate which partner will perform which tasks.

STW will ask for a so-called "project plan" for all rewarded full proposals. This should contain a more detailed planning and budget.

## **Connections with other research**

Mention similar research that is performed elsewhere, either in the Netherlands or in the rest of the world. Describe the relation with your own research and the contacts with these groups (or the plans to establish them).

## **4. Fit within the research topics of the program**

Describe explicitly the fit of the proposal in the program and its research topics. These topics are described on page 1 of this call and in chapter 4 of the Clean Combustion Systems program description . The program committee will use this section particularly for the assessment of the fit in the program.

## **5. Utilization plan**

The utilization plan must be clear to those with general knowledge of the application domain.

### **The challenge from the practice and the proposed solution**

Your research will address problems encountered in industry with not-yet-existing solutions. Indicate the industrial relevance of this problem and the impulse this research gives towards the solution. Indicate which steps you will take to bring the research results into actual practice. Provide details for assessment of the feasibility and the conditions for successful application.

### **The users committee**

All Clean Combustion Systems projects will have "users committees". For further information on this you are referred to the STW website (see Open Technology Program) and the Clean Combustion Systems webpage ('work in progress'). Mention the contact persons from companies and organisations that already accepted invitations to join the users committee, or that are willing to co-operate in another relevant way to realise utilization of results.

### **Past performance in utilization**

Indicate the past successes that the academic team achieved in bringing academic research results into industrial practice, in relation with Clean Combustion Systems or otherwise.

## **6. Contracts and patents**

If there are any contracts relevant to the proposed research project, these should be mentioned here. Also provide patent search results, or the reason why such a search is not necessary for your proposal. Indicate if you have patents or running patent applications in the field of the research. This section takes maximally half a page.

## **7. Budget**

In the main document you find a general explanation on which costs are considered for financing by STW and which are not. All amounts are without BTW (VAT). The length of this section is at maximum one page.

### **◆ Personnel**

*You can apply for temporary staff: PhD-students, post-docs or technicians. Staff is appointed by the executive institution. The actual appointment is subject to prior written permission of STW. STW may*

withdraw a grant if vacancies are not filled within a year after granting. The rates for staff can be found at [www.stw.nl](http://www.stw.nl) → infobalie

◆ **Materials**

*The costs of office and laboratory goods, small instruments and appliances must be specified here. Internal travel expenses of the project are also part of this budget.*

◆ **External travel expenses**

*These are costs for travel and subsistence for congress visits abroad for the project.*

◆ **Investments**

*These are costs for necessary equipment and other investments for the project.*

◆ **Contributions of partners**

*Provide financial and technical (staff and material) contributions that the partners bring to the project. After granting STW will invoice the financial contributions and add them to the corresponding credit of the project. Present details on the capitalization of in-kind contributions as well. For in-kind staff contributions the maximum rates are 106 euro/hr for senior staff and 75 euro/hr for staff up to HBO-level. For material contributions, please explain the capitalization.*

◆ **Overview of the total project costs**

*Present a table with the planning of the staff appointments and the budgets per project year. Use the above mentioned headers. The partner contributions must be specified separately. The total project costs are the costs for STW as well as the contributions of the partners. The contribution requested from STW is at most € 750000. The partner contributions are at least 25% of the total budget.*

**8. Literature**

In maximally two pages list all relevant and publicly available publications of the participating parties of the proposal, as well as relevant publications of others.

**9. Key words, abbreviations and acronyms**

**Appendix: Confirmation letters.**

These confirmation letters written by competent partner authorities, officially state their technical and financial contributions.

**Appendix: Potential referees.**

**(not to be included in the proposal; please submit on separate page)**

List four (inter-)nationally renowned referees that could review your proposal. The referees should be able to review the proposal objectively and therefore should not have participated as co-author in publications of the applicants.

## **Annex 3**

## **Assessment and selection criteria**

Full proposals will be evaluated by peer review on scientific quality and utilization potential.

### **Scientific quality**

- Originality and innovative character of the proposal
- Expected impact on the scientific community
- Research method
- Time schedule
- Budget
- Infrastructure

### **Utilization**

- Potential economic impact
- Past performance in utilization by the applicants
- Contribution to the development of applied knowledge
- Impact on utilization if the project is carried out successfully
- Different steps needed (time path) to utilize the results
- Chance on patents and/or know how agreements
- Participation of users

The jury will be asked to assess the proposals on these aspects and also on the strategic fit within the program, see annex 4.

## **Annex 4**

## **Assessment and selection procedure**

### **Check of the project proposal by STW**

The STW office confirms the receipt of every proposal. A general check is performed whether or not the proposal satisfies all requirements as mentioned in this document. In case of doubt the office will contact the applicant.

### **Peer review**

STW presents the proposal to a number of experts in the field of the proposal. These referees are from the scientific community, knowledge institutes and relevant industry. They will review the proposal on the basis of criteria for scientific quality and utilization potential. These criteria are stated in Annex 3. Per project the comments of at least four referees will be used

STW will combine the comments of the referees in a protocol. In this protocol the comments of the individual referees are made anonymous.

### **Reply by the applicants**

STW will send the protocol to the main applicant requesting to react to the comments of the referees. Applicants may add possible project changes to the protocol in such a way that it is clear which comments have resulted in which changes in the proposal.

### **Assessment by the jury and program committee**

An independent jury of about eight (inter) national experts of universities and industry (applicants will be excluded) will rank the full proposals. Each jury member will give 3 marks for each proposal: one for scientific quality, one for utilization potential and one for the strategic fit within the program. The marks will be averaged with equal weight to one final score for the proposal which determines the ranking. In addition to the ranking by the jury the program committee will formulate an advice on the cohesion between the project proposals and their relevance for the program. The decision of the STW board will be based on the ranking by the jury and the advice of the program committee.

### **Possibility of appeal**

The applicant may appeal against a decision of the STW board by sending an objection letter to the general board of NWO within six weeks after the date of the granting or the rejection letter.

## **Annex 5**

## **Utilization**

A very important aspect is the utilization of the project results in industrial practice. Two mechanisms exist here: partners and users.

### **Partners**

Partners are companies that participate actively in the project execution by means of financial or technical (material and/or staff) support. The contributions of the project partners are an integral part of the project and are stated explicitly in the project proposal. Confirmation letters of the partners are attached to the project proposal. Partner contributions are the main indication for the importance of the research to the partners and for their intention to utilise the results. Therefore partners are seen as users by definition.

### **Users**

Users are interested parties that can potentially use the project results. They are allowed to take knowledge of the progress and results of the research performed. They can be companies, authorities, research institutes, but also consumers or end-users. Users help to make sure that the research is performed as should be and to justify grants from the public sector. For protection of the intellectual properties of the partners it may be necessary for the users to sign a non-disclosure agreement.

The project proposal should mention potential users.

### **Users committee**

STW research is funded largely from public resources. Therefore a proper inspection of the progress and the effectiveness of the research is required. Moreover, the knowledge from the research should be transferred to the community in an optimal way. Therefore, STW demands for all research projects a users committee. Apart from partner representatives, this committee will consist of the users mentioned before and one representative of the program committee. The users committee is composed by the project leader in consultation with STW. Exclusion of users from the users committee is only possible on explicit, substantiated request of an (industrial) partner that delivers a significant contribution to the project.

### **Knowledge management**

Knowledge management is the regulation of the property, the protection and the exploitation of knowledge. Partners and members of the users committee are first in line for gaining knowledge from the results of the research, but they have no rights to exploit or commercialise this knowledge. To gain such rights a "reasonable compensation" has to be provided.

A well-known and generally accepted measure for knowledge protection is the request for a temporary ban on the publication of particular results. This may be required for e.g. the submission of a patent.

## **Annex 6**

## **Procedure after granting**

During the course of a project the following procedures apply. Extensive information is available in the 'Aanwijzingen voor de projectleider'. This document will be enclosed in the letter awarding the grant. It is also available from the STW office.

### **Granting**

The main applicant becomes the project leader, unless otherwise indicated in the project proposal. After granting, the project leader obtains a number of documents in which the legal and financial conditions are stated. The grant is available only after these documents have been signed and returned to the STW office.

Initially, the credits for materials, travel and investments are granted only for the first two years and the staff is granted only for the first three years. STW reserves the remaining budget for the "Request for project continuation" after two years.

### **Project plan**

After granting, the project leader should write a project plan as an appendix to the proposal, containing a more elaborate planning and task scheduling, including the in-kind contribution of the partners. The project plan contains a rolling forecast: At least once a year and whenever necessary the project plan is adapted to the situation. The next year is planned with most detail. The project plan is written together with the partners and is presented to STW as well as the users committee..

The commitments of the project partners to the execution of the project as put forward in the project plan may form a project contract between the partners and STW. A detailed division of tasks is given.

### **Start of the project**

The budget is available from the moment that the abovementioned documents are received by STW. The start date of the project is the date of the appointment of the first staff member. Usually, this is not the date of granting.

### **Users committee en reporting**

Approximately six months after the start of the project the users committee will meet for the first time. Hereafter, the committee will meet about twice a year to discuss the progress. The users committee will receive all scientific publications for approval prior to publication. They will also receive all progress reports.

The project leader reports semi-annually on the progress of the research to the STW office. The representative of the program committee reports to the program committee on the progress of the project in terms of issues and recommendations.

### **Continuation of projects**

For projects that last for three years or longer, the project leader must submit a continuation request one and a half year after the start of the project. To decide on the continuation STW will be advised by the users committee.

### **Termination**

Termination of projects before the official final date is possible if the commitments are not fulfilled (anymore) or if the scientific quality of the research or utilization is below the required level.