

# Extract from the reporting 2008

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## ACHIEVEMENTS

The Competence Center Environment and Sustainability of the ETH Domain was established on January 1, 2006. CCES supports different types of activities, including research projects, integrative elements such as research platforms and strategic initiatives, as well as education and outreach activities.

CCES funds large-scale collaborative research projects, involving more than one CCES institution with 3 to 5 years duration and an overall budget of CHF 3 to 9 Mio. which cannot normally be tackled using existing funding sources. These projects identify research themes of high relevance for sustainability and high scientific excellence in the following five Education and Research Units (ERUs): Climate and Environmental Change (CLENCH), Natural Resources (NatuRe), Natural Hazards and Risk (HazRi), Food, Environment and Health (FEH) and Sustainable Land Use (SuLu).

In addition to research projects, different categories of Integrative Elements are at least partly funded: the CCES-supported research platform Swiss Experiment brings together field measurement with cyber-infrastructure. The Center for Genetic Diversity is another CCES-supported platform for research on all aspects of genetic diversity.

The main focus of the 2006 to 2008 initial phase has been the establishment of multidisciplinary inter-institutional research projects in the fields of environment and sustainability: a portfolio of 17 research projects and two research platforms has been initiated with the participation of more than 600 scientists and engineers from the schools and research institutions of the ETH Domain. The CCES support is being used to successfully leverage matching in-kind and third-party contributions amounting to an overall volume of over CHF 100 Mio. of research and development activities. It should be pointed out that CCES projects have a high presence in SNF-funded activities and in the 7<sup>th</sup> Framework Programme of the EU; the various involved partners acquired the experience in developing, writing, and evaluating complex large-scale multidisciplinary projects; CCES established the appropriate administrative structures and procedures to ensure the managerial and quality control of the Competence Center and its activities.

CCES achieved all the aims and milestones planned for the initial period. The consolidation of CCES beyond the research projects and towards a more direct knowledge and information exchange with society and stakeholder groups will be one of the challenges of the coming years. On the basis of the successful implementation and of the excellent portfolio of research activities initiated in 2006 to 2008, we are confident that the synergistic potential of CCES will be fully realized in the next phase.

## 1 RESULTS OF THE RESEARCH PROJECTS AND STAKEHOLDER INVOLVEMENT

CCES supports different classes of activities, including research projects, integrative elements such as research platforms and strategic initiatives, as well as education and outreach activities. Different evaluation criteria are used to evaluate the various types of activities.

### 1.1 Research projects

#### *Selection criteria for research projects*

CCES funds only large-scale collaborative research projects of high societal relevance involving more than one CCES institution. Budgets and activities are structured according to a three-part funding scheme, with comparable components supported by (i) the ETH Board through CCES, (ii) dedicated in-kind resources from the participating institutions, and (iii) third-party funding (industry, SNF, EU, federal offices).

Added value is a criterion for successful evaluation. Projects are expected to show the additional value to be obtained in terms of critical mass and scientific excellence by the proposed project team and expertise, and why the proposed research goals could not be achieved without CCES support. In addition, successful projects are expected to fulfill CCES-defined criteria, such as societal relevance and cooperation across the ETH Domain. Societal relevance has to be demonstrated in the project description, either as a goal to be achieved during the project duration or within an identified follow-up implementation phase. Additional criteria are the importance of the project for long-term sustainability and for a durable structuring effect, and the relevance in the international context, and in particular the potential for applications in developing countries. Finally, defining criteria are the experience, quality and international recognition of the consortium, the expected strengthening of collaboration among institutions and the positioning in the international research area.

#### *Selection processes for research proposals*

The preparation and evaluation of CCES proposals follows a specified procedure which has been described in detail in the annual reportings of the preceding years. These criteria formed also the basis for the questions to be answered by the CCES evaluation taking place in January 2009.

#### *Research coordination and portfolio realignment of participating institutions*

An active participation in CCES requires the focusing of the priorities and research agenda of participating institutions on key themes of high significance. The requirement of raising at least one third of the project resources internally is also producing a portfolio realignment of participating institutions, and is implemented in different ways by the participating institutions.

Semi-annual meetings of the Principal Investigators of CCES projects and platforms have been implemented in 2008. These meetings support information exchange among CCES projects and for corporate identity formation and have to be further developed in the future.

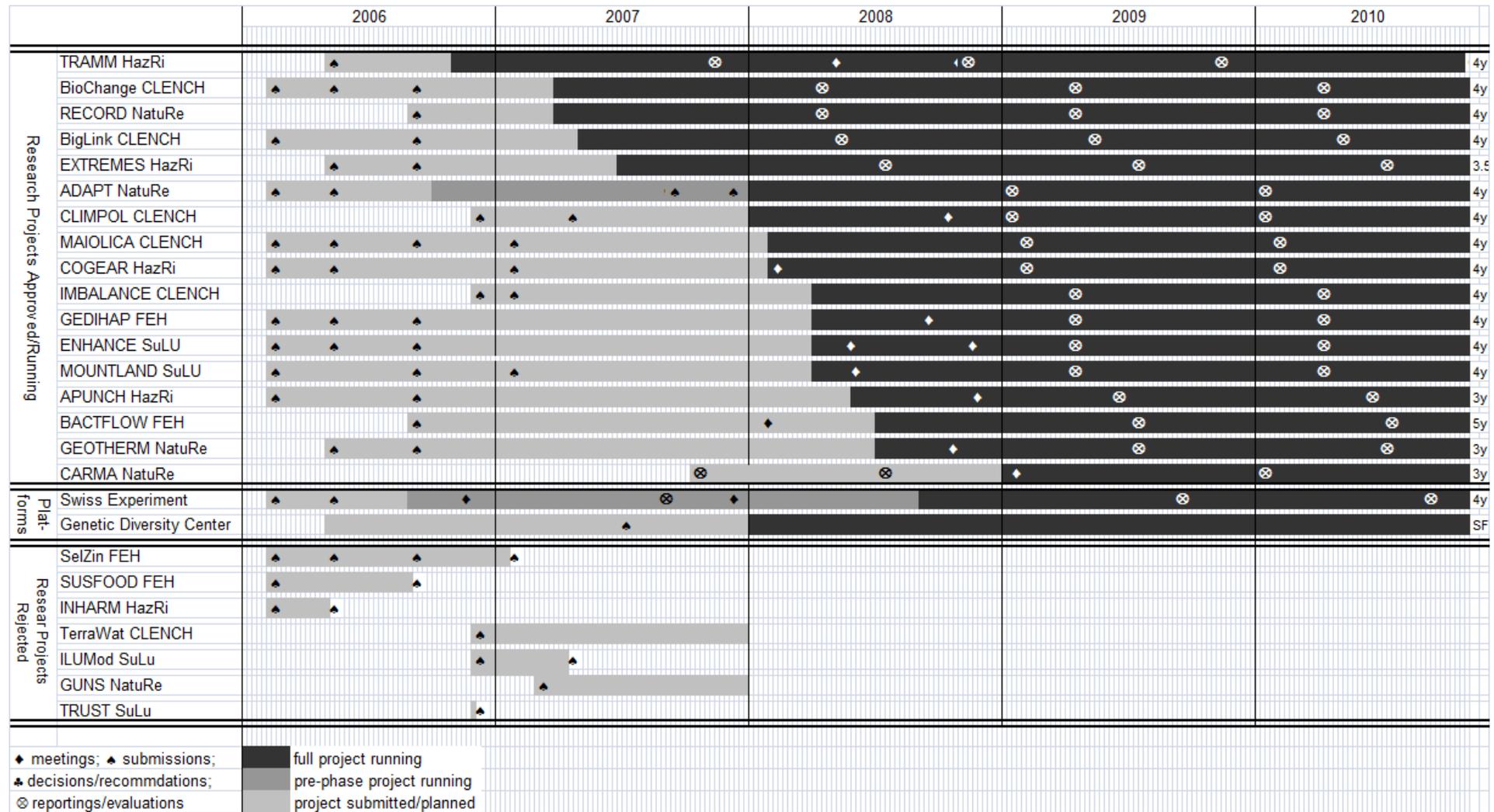
Different types of project meetings, such as annual or semi-annual project meetings or post-doc and PhD meetings, form an integral part of each project Work Plan. Since at least two institutions of the ETH Domain participate in a CCES project these meetings have not only an integrative effect among disciplines but also among ETH Domain institutions.

Annual project reports ([http://www.cces.ethz.ch/downloads/CCES\\_project\\_report\\_template.doc](http://www.cces.ethz.ch/downloads/CCES_project_report_template.doc)) are another constituent of triggering research alignment and coordination. The Principal Investigators report on the activities and achievements of their project in the past year based on the Work Plan. In case of deviations from the original Work Plan, correction measures are negotiated between the Principle Investigator and the CCES Director/Manager allowing the CCES management to actively strengthening the cooperation among project partners from different institutions.

The co-ordination and interaction of CCES projects becomes tangible also in around 80 experimental sites covering an impressive range of environments and ecosystems mainly in Switzerland which have been established in the past two years (see Figure 1). Many of them are interacting via the research platform Swiss Experiment.



Figure 2: CCES activity chart 2006 to 2010



*First scientific and/or outreach results of the projects*

For each project, applicants have described the overall plan to disseminate, promote and exploit the knowledge derived from the project within and beyond the consortium in their project proposal; the proposed strategy has been approved by the Research Commission and the Steering Board.

In the 2006 to 2008 period more than 200 publications and presentations, respectively, have been made by CCES project partners. 10 large scale EU FP7 and SNF Sinergia proposals have been submitted or approved and important second- and third-party funds have been acquired by CCES projects (e.g. SNF, federal and cantonal authorities).

An evaluation of CCES as a whole was carried out in January 2009 by the Advisory Board. Concerning the quality of the research the Advisory Board states (p. 5): *“Some very promising collaboration started which has been made possible by CCES. The centre is a model that really works. A broad approach like the one set up by CCES is also needed when Switzerland wants to play a role in Europe and internationally in the field of large-scale environmental and sustainability research.”*

*Patents, licenses, spin-offs*

It is too early in the program to evaluate the potential outcome in terms of patents, licenses and spin-offs. CCES focuses in this first phase on more basic research. However, this type of products is expected to increase with time.

**1.2 Integrative Elements***Research platforms*

- Swiss Experiment (SwissEx): After a pilot phase starting in 2006, the full project of SwissEx, funded by CCES with CHF 2.6 Mio., started in August 2008. This research platform has developed into a strong CCES activity and has received continuing support from all involved institutions as well as secured external funding from strong partners such as NCCR MICS, EU, SNF and Microsoft. The SwissEx has started to develop critical activities in the areas of sensor development, data acquisition and processing, education and community building. It has successfully deployed wireless, autonomous sensor networks in several places in the Swiss Alps. 7 CCES projects are participating in the SwissEx (all 4 projects of the ERU HazRi plus BigLink, RECORD and MOUNTLAND). A proposal for a science module of SwissEx has been submitted to the Research Commission for evaluation in December 2008.
- Genetic Diversity Centre (GDC): GDC is a technology and knowledge platform in the ETH Domain for research on all aspects of genetic diversity, managed through the Institute of Integrative Biology at ETH Zurich. GDC supports research that requires the measurement and analysis of genetic diversity in natural, managed and laboratory populations. The CCES projects BioChange and GEDIHAP are participating in GDC which was supported by CCES with seed funding in 2007.

*Strategic initiatives*

- Cooperation with Singapore: In December 2007, the National Research Foundation Board of Singapore approved the Program on Environmental Modeling and Monitoring (EM&M) with a budget of approx. CHF 62 Mio. for 5 years. The start of the new program is delayed due to differences on intellectual property aspects between Singapore and Switzerland.
- Public Private Partnership on Natural Hazards and Risk Management: A two-year pilot phase with WSL leadership to identify and start a first series of application projects with industry support was initiated by CCES in 2007 to 2008. No concrete projects could be started so far partly due to lack of interest of ETH Domain partners.

*Education and outreach*

- Education and Outreach: CCES supported the elaboration of a business plan suggesting possible activities whose implementation were postponed by the Steering Board in view of uncertainties in the resources 2008 to 2011, and in view of the mandate of the participating institutions in education.
- On November 6, 2008 CCES, in-cooperation with ETH Zurich and the Club of Rome, organized a public lecture with Dr. R. Pachauri, Chairman IPCC, entitled “Climate Change - What next?” followed by a panel discussion at ETH Zurich which were attended by more than 400 persons (see [http://www.cces.ethz.ch/news/Pachauri\\_flyer\\_2008\\_10\\_21.pdf](http://www.cces.ethz.ch/news/Pachauri_flyer_2008_10_21.pdf)).
- Visiting Scholars Program: The program is stalled due to limited CCES funding availability.

### 1.3 Satisfaction of stakeholders outside of the ETH Domain

CCES aims at a close collaboration with various sectors of society. In its initial phase, the Steering Board has put strategic emphasis on the implementation of a large-scale research program of high scientific quality in the field of environment and sustainability. This research forms a valuable basis for a stronger involvement of research partners and stakeholders outside the ETH Domain in the coming phase which is confirmed by the Advisory Board in its evaluation report (p. 4): *“The amount of links of the projects with public service bodies and policy makers is considerable. ... since very few places in the world have such strong linkages to the industry and societal decision-makers, these groups should be involved more actively in the future.”*

Discussions started already in 2007 with federal and cantonal authorities and technical offices indicating that a concrete, visible presence of the ETH Domain is very welcome at all levels. Furthermore, scientific co-operations with Swiss Universities, Universities of Applied Sciences and the Swiss Agricultural Research Stations might benefit from joint interests in different research fields and complementarities in the field of knowledge transfer and outreach. However, concrete activities have not been initiated in 2008 due to lack of financial means and the uncertain future of CCES.

## 2 ETH DOMAIN-WIDE FOCUSING OF RESEARCH

### 2.1 Focusing of research

The degree of focusing of research achieved by CCES is remarkable. Approved projects have normally 7 to 13 principal investigators from 2 to 5 institutions, covering and merging all complementary aspects and disciplines of a single scientific issue. The degree of involvement of relevant groups, institutes and departments in the participating institutions is also almost complete. The effectiveness of these efforts is confirmed by the Advisory Board when stating (p. 3): *“The research portfolio is well-balanced, consisting of a broad spectrum with regard to topics as well as to approaches while still allowing in-depth analyses. Substantial networking within the framework of joint research as well as serious efforts to reach an added value has become evident from the presentations.”*

### 2.2 Reduction of redundancy

A long-term goal of CCES is to identify strengths and weaknesses of the participating institutions, highlight areas where future investments will be required and suggest structural measures toward abating redundancies. The potential for reduction of redundancy is recognized by the Advisory Board in its evaluation report (p. 4): *“The existence of the center is very important given the competition in some fields between the institutions of the ETH Domain. The fact that CCES brings together people on the research level creates considerable momentum in terms of team building.”*

### 2.3 Added value

In addition to be a prescribed criterion for proposal selection (see Point 1.1), added value at the institutional level is an overall goal of CCES. Concrete steps achieved in the first three years include:

- Forming of multi-disciplinary consortia of high quality and international recognition, with sufficient critical mass to tackle key scientific problems of societal relevance is confirmed by the Advisory Board (p. 4): *“The majority of the projects are of highest quality. ... some of the projects have a great potential for cross-fertilization within single ERUs and are filling a gap there. ... Some of the projects are closing a gap in fields where Switzerland has not been very active so far.”*
- Also the improved capacity of many teams to write and manage large-scale collaborative projects, preparing them to approach large European projects as well as the forthcoming performance-based, strategy-oriented Swiss research area is confirmed by the Advisory Board (p. 5): *“The centre is a model that really works. ... The investments made in CCES so-far are very cost-effective.”*
- Strengthened collaboration among institutions, and in particular improved involvement of teams and scientific competences from the research institutions of the ETH Domain, has been discussed in the preceding subsections.

- First scientific and/or outreach results of the projects in increasing public visibility of the ETH Domain in the crucial field of environment and sustainability are confirmed by the Advisory Board (p. 3): “*CCES makes environmental research in the ETH Domain much more visible. CCES has the potential to bring the institutions of the ETH Domain to the academic frontier in the area under consideration which might not happen without CCES.*”

## 2.4 Education and outreach

The discussion of concrete activities in that field has been postponed by the Steering Board in view of uncertainties in the future strategic orientation of CCES as already stated in Annual Reporting for the year 2007.

## 3 ACHIEVEMENT OF THE AIMS STATED IN THE BUSINESS PLAN

### 3.1 Milestones

According to the Business Plan, after an initial 2-year implementation phase (2006 to 2007), CCES entered an operation phase in 2008. The goal of this second phase consists in consolidating the achievements of the implementation phase and in preparing the coming program phase.

### 3.2 Quality

Quality is assured through different mechanisms:

- The overall quality of CCES in terms of procedures, outcomes and long-term impacts is provided by the constructive interaction of the Steering Board and the Advisory Board (see Point 3.3).
- The scientific excellence of the research proposals is ensured by the rigorous and independent peer-review process and quality control procedures (input, output and outcome indicators).
- Quality of running research projects is controlled on the basis of annual project reports to be submitted by the Principal Investigator (PIs) to the CCES Management. They report on work progress, the use of financial means and achievements in the reference periods, and, in case of deviations from the original Work Plan, suggest necessary modifications for the coming project year. This valuable interaction between the PIs and the CCES Management has to be further developed as a tool for supporting the PIs in achieving CCES quality goals.
- The quality and relevance of the outreach and education initiatives is ensured by the active participation of the institutions and departments.
- The administrative quality is guaranteed by the Office of Finances and Controlling of ETH Zurich. A procedure for the audit of CCES projects has been developed in co-operation with an external auditor and upon recommendation of the Office of Finances and Controlling of ETH Zurich (see [http://www.cces.ethz.ch/downloads/CCES\\_audit\\_procedure.pdf](http://www.cces.ethz.ch/downloads/CCES_audit_procedure.pdf)). The audit will be applied as from 2009.

### 3.3 Steering Board, Management Committee, Advisory Board

The Steering Board (SB) is responsible for the overall strategy, planning, resource allocation, profile and public recognition of CCES. As a consequence of her election as a City Councilor of Zurich, Ruth Genner resigned from her position as member of the SB in 2008 and has not been replaced so far.

The Management Committee (MC) is primarily responsible for the promotion of a portfolio of research activities to fulfill the ERU definition and the CCES expectations, for information exchange and knowledge integration among the research consortia. Since under the present financial framework no programmatic decisions had been expected in the nearer future, the SB decided in April 2008 to discontinue the MC. Strategic decisions are taken by the SB based on recommendations of the Advisory Board. Managerial issues are handled by the CCES office and Director.

The Advisory Board (AB) is responsible to provide scientific and strategic advice on the overall strategy and profile of CCES, on the quality of its activities and on the comparison of CCES with worldwide institutions of similar profile. No meeting of the AB took place in 2008 because it accomplished the evaluation of CCES in January 2009.

### 3.4 Problems and open issues

CCES promotes a new framework and new mechanisms for large-scale research and co-operation. As such, CCES had to deal with some difficulties and open issues in its implementation phase which were brought up also by the CCES Advisory Board during the CCES evaluation in January 2009 and shared by the CCES management (evaluation report, pp. 3-5):

- **Raising international visibility:** *“The sustainability issue is more urgent than ever and leading research institutions like those of the ETH Domain have to deal with it actively. ... It is suggested that this research should be made more visible also internationally which is the next step to go.”*
- **Improving team building and educating scientific leaders:** *“The Advisory Board saw some excellent examples of good team building and young scientists from a variety of backgrounds getting together on a hot topic, but also leadership by young scientists. Nevertheless, substantial differences between projects still exist. ... The issue is considered to be very important and has to be pursued.”*
- **Enhancing integration and achieving synergies:** *“For some projects, integration efforts are well underway whereas others have not fully reached it yet. Many of the groups are only at the beginning of their work and the contribution of their project to CCES is difficult to evaluate at this early stage. ... Synergies from interactions among partners from different fields in the same project and among projects are already being developed but have to be further encouraged.”*
- **Fostering interactions internally and externally:** *“The integration and interaction issue is a central issue to be dealt with in the coming two years. The potential of the projects for cross-fertilization within ERUs and across ERUs must be developed vigorously as well as the links to end-users. In addition, since very few places in the world have such strong linkages to the industry and societal decision-makers, these groups should be involved more actively in the future.”*
- **Triggering outreach:** *“Regular larger conferences on the ERU level with an international target audience similar to the LATSIS Symposium should take place as well as workshops and conferences on the project level with a more national also non-scientific audience.”*
- **Establishing evaluation mechanisms:** *“CCES should work out a mechanism for the review of single projects as well as for the center as a whole. The difficulty of building up broad project teams while understanding what single people are doing is recognized. Therefore, concepts should be developed for how to measure and weight interdisciplinary versus disciplinary contributions to the success of large-scale collaborative research projects.”*
- **Promoting ambitious and risky types of research:** *“In the coming phase CCES should place a much greater emphasis on its projects undertaking the most ambitious and hence also risky types of research. Such research is both essential in the environmental sciences and critically important for the ETH domain to rank in the very top research institutions in this field worldwide. Long-term strategic investments should be made by CCES taking this into account.”*
- **Ensuring a long-term perspective:** *“To develop a program like CCES is an ambitious endeavor and the commitment of the ETH Domain for such a strategic decision is acknowledged. ... A well-planned and stable financial basis in the order of a decade is what can really make CCES unique. Such a longer perspective would allow translating the agenda of CCES also into tangible societal benefits and thus CCES becoming a cutting-edge endeavor and a real center of competence instead of a research center only. It would allow doing also applied research with societal relevance incorporating components of fundamental research of high quality.”*

## 4 USE OF THE ETH BOARD FINANCIAL MEANS

CCES has reached now the portfolio of research activities possible with the funds available or expected for the period 2006 to 2011. All 17 projects and 2 platforms started for which the Steering Board (SB) approved a CCES funding ceiling of CHF 30.4 Mio. Since definite decisions of the ETH Board on the budgets of the Competence Centers for the years 2010 to 2011 have not been taken, the SB decided in April 2008 that the definite level of CCES funding to CCES projects will be determined only after the decision of the ETH Board on the definite funds for the years 2010/11.

## **5 PLANNED ACTIVITIES**

The opinion of the Advisory Board in its evaluation report is shared that the sustainability issue is more urgent than ever and leading research institutions like those of the ETH Domain have to deal with it actively. Taking into account its size and complexity, the implementation status of CCES is very good.

On the basis of the successful implementation and of the excellent portfolio of research activities initiated in 2006 to 2008, we are confident that the synergistic potential of CCES will be fully realized in the coming three years by dealing with the points brought up in Section 3.4. The consolidation of CCES beyond the research projects and towards a more direct knowledge and information exchange with society and stakeholder groups will be one of the challenges of the coming years.

Details on CCES can be found at [www.cces.ethz.ch/](http://www.cces.ethz.ch/)