

Extract from the reporting 2006

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ACHIEVEMENTS

The Competence Center Environment and Sustainability of the ETH Domain was established on January 1, 2006. 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.

CCES funds large-scale collaborative research projects, involving more than one CCES institution. Research projects will identify research themes of high relevance for sustainability and high scientific excellence, in the following five Education and Research Units: Climate and Environmental Change (CLENCH), Natural Resources (NatuRe), Natural Hazards and Risk (HazRi), Food, Environment and Health (FEH) and Sustainable Land Use (SuLu).

CCES funds projects of scale and scope which cannot normally be tackled using existing funding sources, i.e. with 3-5 years duration and an overall budget of 4-10 MCHF. Proposal 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).

Projects are evaluated three times per year and are selected by the CCES Steering Board after passing a rigorous international peer-review. In 2006, the CCES Steering Board approved 6 research projects, of which 1 project for seed funding, and 1 research platform (the Swiss Experiment). Presently 15 further projects are under review, either resubmitted or under first submission.

In addition to research projects, different categories of Integrative Elements are supported. The research platform Swiss Experiment brings together field measurement with cyber-infrastructure. Strategic initiatives such as the reorganization of natural hazards and risks activities and a cooperation with Singapore have been launched. Several education and outreach activities are under way: a work group on teaching and outreach is carrying out a survey on possible complementary activities and will suggest a possible joint strategy to the Steering Board; CCES will host the Latsis-Symposium 2007 'Research Frontiers in Environment and Sustainability' taking place at ETH Zurich, September 17-19, 2007; a visiting scholars program has been established and support to participation in FP7 programs is provided.

Within the first year of implementation, CCES achieved or is completing all the aims and milestones set for the initial 2-years implementation period: create a synergistic portfolio of research activities and research platforms involving all participating institutions; re-focus the research portfolio of participating institutions; establish consortia with the critical mass and multidisciplinary expertise required to tackle scientific issues of crucial societal relevance with a strong participation of research groups at EAWAG and WSL; engage the support received for the start-up phase and set up the required administrative, management and quality control structures and procedures.

According to its 10-year business plan, CCES aims and expects to build a portfolio of activities with an overall yearly budget in the order of 25-30 MCHF per year (including various sources of funding). This would roughly correspond to over 250 new or dedicated people working on CCES projects, strongly increasing the critical expertise in key domains.

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 different types of activities.

1.1 Research projects

Selection criteria for research proposals

CCES funds large-scale collaborative research projects, involving more than one CCES institution. Research projects will identify research themes of high relevance for sustainability and high scientific excellence, in one of the five identified priorities of CCES: Climate and Environmental Change (CLENCH), Natural Resources (NatuRe), Natural Hazards and Risk (HazRi), Food, Environment and Health (FEH) and Sustainable Land Use (SuLu).

Added value is a criterion for successful evaluation. Proposals 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 defining criteria, such as societal relevance and cooperation across the ETH Domain. Societal relevance will have 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.

CCES funds projects of scale and scope which cannot normally be tackled using existing funding sources, i.e. with 3-5 years duration and an overall budget of 4-10 MCHF. Proposal budgets and activities are structured according to a three-part funding scheme, with comparable components supported by (i) the ETH Rat through CCES, (ii) dedicated in-kind resources from the participating institutions, and (iii) third-party funding (industry, SNF, EU, federal offices).

Selection processes for research proposals

The preparation and successful evaluation of CCES proposals follows prescribed steps:

- Yearly nation-wide ERU meetings are organized to discuss within the informed community ideas and priorities for innovative research projects and build research consortia.
- Themes for the research projects are proposed by individual investigators and approved by the Management Committee, responsible to promote a portfolio of research activities which define the CCES profile as described in the Business Plan.
- Full proposals are then submitted to the Research Commission (RC), consisting of the ETHZ Forschungskommission augmented, to ensure a balanced review, by scientists from EPFL, EAWAG and WSL. The evaluation of the projects is conducted by international peer-review, following the strict criteria used by the RC. The peer-review evaluation covers the whole research package presented in the proposal, including the components to be supported by in-kind or third-party sources.
- The choice of the proposals to be funded in every period is done by the Steering Board (SB), on the basis of the recommendations of the RC, the results of the peer-review evaluation, the added value, the adherence to the CCES design and the overall profile of the ERU. Expectations are that the SB will deviate from the recommendations of the RC only in well-justified cases.

Deadlines for proposal submission are aligned with the ETHZ RC schedule, three times per year on January 15, April 15 and September 1.

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.

For example, the strategic plan 2008-2011 of S-ENETH (the School Domain of Earth, Environment and Natural Resources at ETH Zurich) identified five strategic priorities, of which four were implemented as ERUs under CCES. S-ENETH sets aside over 2% of the departmental budget to support the participation of its scientists in CCES projects; additionally, individual professors and groups are also engaging their own resources, thereby concentrating a higher critical mass on selected key topics.

Statistics: Number of proposals submitted/accepted per ERU and institution

CCES completed in 2006 two rounds of proposal selection. A third deadline for submission of proposal was on January 15, 2007, and the external peer-review is underway.

In the first two calls, the CCES Steering Board approved six research projects, of which one project for seed funding, and one research platform (the Swiss Experiment). The allocation of resources among ERUs and institutions is given at Point 4.

First scientific and/or outreach results of the projects

It is too early in the program to expect scientific and/or outreach results of the projects. However, project applicants are asked to describe the overall plan to disseminate, promote and exploit the knowledge derived from the project within and beyond the consortium in their project proposal.

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 advanced research, and this type of outcome is expected to increase with time.

1.2 Integrative Elements

Research platforms

- **Swiss Experiment:** The Swiss Experiment platform project will bring field measurements together with cyber-infrastructure for an unprecedented field investigation of environmental processes. 250 kCHF pre-phase funding has been approved by the Steering Board in August 2006. There is a strong interest of industry partners and large potential for international (Singapore) and national (High Performance Computing Initiative) initiatives. Submission of full proposal planned for the first half of 2007.
- **High Performance Computing Initiative:** The aim of this initiative is to coordinate and raise the scientific supercomputing capabilities of Swiss science and technology to a level appropriate to the leading-edge research carried out in the institutions of the ETH Domain. A report of May 2006 suggests the strategic framework, the research challenges and the technical requirements.

Strategic initiatives

- **Cooperation with Singapore:** Singapore seeks large scale co-operation in the fields of global environmental sustainability. CCES will cooperate with CCEM and the other CCES institutions.
- **Reorganizing natural hazards and risks activities / Public Private Partnership 'Swiss Centre on Natural Hazards and Risk Management' (SC-NHRM):** Participants from all CCES institutions agreed on the activities to be jointly coordinated in the future and designated the responsibilities as a follow-up of CENAT in November 2006. Work group constituted to evaluate the possibilities for a PPP knowledge transfer exchange platform SC-NHRM.

Education and outreach

- Work Group on Education and Outreach: A work group with representatives from all ETH Domain institutions and different specialization has been constituted. A survey on possible complementary activities is carried out and a strategy paper suggesting possible activities will be presented to the Steering Board in May 2007.
- Latsis Symposium 2007 'Research Frontiers in Environment and Sustainability' taking place at ETH Zurich, September 17-19, 2007. The event will provide an overview on the common challenges in the domain of environmental sustainability, with five scientific sessions in the thematic research areas of CCES. A public policy forum with participation of policy makers and industrial leaders, focusing on the role of science and innovation in meeting society demands in environmental sustainability.
- Visiting Scholars Program: The program aims at attracting renowned scholars to visit CCES partner institutions and to interact with and participate in CCES projects or technology platforms by providing a rapid mechanism for involving foreign scholars in CCES activities.
- Support of the participation in EU FP7: CCES partners are encouraged to actively participate and take leading roles in FP7 programs as a source of third-party funding. CCES will provide start-up financial support to investigators preparing to coordinate FP7 proposals, and will facilitate project management.

1.3 Satisfaction of stakeholders outside of the ETH Domain

CCES aims at a close collaboration with various sectors of society. Although the program is still at a very early stage of implementation and recognition, on-going discussions with federal and cantonal authorities and technical offices indicate that a concrete, visible presence of the ETH, with a portfolio of large-scale projects and a focus on implementation, is very welcome at all levels. CCES will strive to concretize this support and to structure it with long-term agreements.

2. ETH DOMAIN-WIDE FOCUSING OF RESEARCH

2.1 Focusing of research

The degree of focusing of research achieved by CCES in only one year is remarkable. Approved projects have normally 6-10 principal investigators from 2-4 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. Following an initial phase of skepticism, all relevant groups are now either participating or leading proposals, and contributing major human resources, instruments, and infrastructure essential for achieving the goals of the projects. In addition, the degree of satisfaction of the participating institutions has markedly improved, as so has the quality of the proposals and the chance of successful selection.

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 input for this long-term goal will come later in the program.

A concrete, already implemented measure is the elimination of the redundancy in the definition of the strategic projects between CCES and S-ENETH. To this aim, S-ENETH has decided to (i) align its agenda with CCES by proposing four out of five of its strategic priorities 2008-2011 to be implemented as ERUs under CCES, (ii) unify the selection of the large-scale collaborative projects under CCES, and (iii) reserve part of its ordinary budget to the participation of its scientists in CCES projects. This very concrete approach resulted in a unified selection procedure and a single table for strategic discussions.

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 year of implementation include:

- forming of multi-disciplinary consortia of high quality and international recognition, with sufficient critical mass to tackle key scientific problems of societal relevance;
- 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;
- strengthened collaborations among institutions, and in particular improved involvement of teams and scientific competences from the Research Institution (WSL, EAWAG);
- increasing public visibility of the ETH Domain in the crucial field of environment and sustainability.

2.4 Education & Outreach

Education and outreach are part of the institutional mandate of the participating schools (ETHZ, EPFL) and, in different measure, of the participating research institutions (WSL, EAWAG). The role of CCES here is one of integration and facilitation. As detailed at Point 1.2, a CCES working group is now working on an in-depth analysis and on the preparation of a white paper covering an integrated concept for education and outreach in the whole environmental sustainability sector, including graduate education, continuing education, corporate communication and media outreach. This planning paper is prepared together with the competent institutional representative bodies (such as Studiendelegierte, Unterrichtskommission and Corporate Communication Office) and is not in competition with institutional activities.

3. ACHIEVEMENT OF THE AIMS STATED IN THE BUSINESS PLAN

3.1 Milestones

As described throughout the whole document, CCES has already achieved or is completing all the aims and milestones set for the initial 2-years implementation period. Of particular relevance, within the first year of installation CCES achieved to:

- create a synergistic portfolio of research activities and research platforms involving all participating institutions;
- re-focus the research portfolio of participating institutions;
- establish a new leading role for research groups at EAWAG and WSL;
- engage all CCES funding granted for 2006-2007;
- set up the required administrative and management structures and procedures.

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 Management Committee, the Steering Board and the Advisory Board (see Point 3.3);
- the scientific excellence of the research projects is ensured by the rigorous and independent peer-review process accomplished by the enlarged ETHZ Research Commission. Proposals include a comprehensive management plan, with clear milestones, deliverables, risk assessment and quality control procedures (input, output and outcome indicators);
- 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 ETHZ.

3.3 Steering Board, Management Committee, Advisory Board

The CCES administration is based on the integration of three bodies with distinct mandate and composition.

The **Steering Board** (SB) is composed by the President of the ETHZ (Leading House), a second representative of ETHZ appointed as SB Chairman, the President and a second representative of EPFL, the Directors of WSL and EAWAG, and members from industry and politics (presently Christian Mumenthaler of SwissRe, and Ruth Genner of the Green Party). The SB is responsible for the overall strategy, planning, resource allocation, profile and public recognition of CCES. The Steering Board meets three times per year.

The **Management Committee** (MC) is composed by the CCES Director; leaders of the Education and Research Units (professors/senior scientists actively involved in existing ERUs), additional members from the social and economic sciences, one member for the North-South dialogue and the Executive Manager (presently 16 members representing all disciplines and all participating institutions and departments). The 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. The MC meets at least three times per year, and participates actively in the ERU activities.

The **Advisory Board** (AB) is composed of currently 6 members from leading international research institutions with recognized expertise in one or more of the CCES focal themes. Present members are: Sierd Cloetingh, Free University of Amsterdam; Rita R. Colwell, University of Maryland; Charles Godfray, Imperial College; Ignacio Rodriguez-Iturbe, Princeton University; Marcel Tanner, Swiss Tropical Institute; Heinz Wanner, University of Berne. The 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. The Advisory Board will convene for the first time in September 17-19, 2007, in occasion of the Latsis Symposium in Zurich.

3.4 Problems and open issues

CCES and generally all the CCs promote a new framework and new mechanisms for research projects. As such, CCES had to deal with some difficulties and open issues:

- Preparing and writing large-scale collaborative projects proved difficult in the first call, but the quality of the proposal has consistently improved in subsequent calls; the same is true for the reviewing process, which has markedly improved in the second call.
- Uncertainty regarding the mid-term support of the CCs from the ETH Board has made the agenda definition as well as the structuring inside our institutions more difficult.
- The establishment of the CCs met with open opposition in many sectors at ETH Zurich (but also in the other participating institutions) and mostly in those sectors not directly involved in the CCs established so far, which see the imposition of top-down structures as threatening the institutional ordinary funding. It will be important to see what role the CCs are expected to play in the new performance-based Swiss research arena, and if this combination of top-down domain definition and bottom-up content definition will assume a larger or more established future role.
- With the new autonomy and the increasingly complex possibilities for collaborative research, individual professors are overloaded. CCES offers new and exciting possibilities, but the overall overhead keeps increasing, and an active participation in CCES is necessarily reducing the capacity to participate in other frameworks. Not all professors and senior scientists were initially willing to commit the time required for the domain analysis and accurate planning of large projects.
- As a consequence of the personal autonomy and independence of individual professors, departments at ETH Zurich appear to have more difficulty to coherently focus their strengths on specific targets, whereas the Forschungsanstalten (EAWAG and WSL) have a structure more suited for the concerted actions required by the Competence Centers.
- Some of the objectives expected from the CCs – as requested by the questions of this report – will probably not be reached with the available resources. The ETH Board financing of 5 MCHF/yr to CCES correspond to about 2% of the overall budget (Grundauftrag) of the participating institutions and departments (S-ENETH, D-BAUG Env. Eng. and Geomatics, EPFL/ENAC, WSL, EAWAG). The matching in-kind and third-party funding will triple the volume of activities in

CCES, but it also requires additional efforts. With the amount invested so far by the ETH Board, it is not realistic to expect a massive redirection of strategic planning nor structural measures aimed at reducing redundancies.

- CCES and CCEM share the general domain of sustainability. The subdivision is artificial, and many important projects could fit under both: for example, projects focusing on the influence of climate change on energy policy, or the safety of the energy sector, or the integral approach to CO₂ capture and sequestration. The two CCs have discussed ways to support joint projects spanning across the two CCs and will reserve part of the 2008-2011 funds to special calls targeting topics of common interests.
- Unlike CCEM – relying on the two Energy Science Centers existing at ETHZ and EPFL – CCES spans a very large domain whose coordination at ETH Zurich has only recently been initiated by S-ENETH. With the aim of ensuring domain coordination, CCES introduced the Management Committee. The relationship between Steering Board and Management Committee has at times been contrasted. In addition, CCES had to fill an organizational vacuum and has unwillingly been perceived at times as competing with its own participating institutions (i.e. in the sector of education and outreach).

4. USE OF THE ETH BOARD FINANCIAL MEANS

CCES received a support of 10 MCHF from the ETH Board for 2006-2007.

With the approval of the first 7 projects and platforms, CCES has already engaged 8.66 MCHF, which will support the completion of the approved projects till 2011. In addition, CCES has central expenses of about 340 kCHF/yr. All inclusive, CCES has so already engaged the whole support received for the start-up phase. However, since most projects are at the beginning or in final negotiation, 8.66 MCHF of the initial grant of 10 MCHF will not be used within 2007 and will be ported to 2008-2011 to support the already approved projects.

The partitioning of CCES support to the ERUs and participating institutions (in kCHF) for approved projects is as follows: *)

ERU	Institution				Total
	ETHZ	EPFL	EAWAG	WSL	
CLENCH	2'156	0	761	822	3'739
HazRi	1'131	1'222	0	927	3'280
NatuRe	798	138	747	352	2'035
Total	4'085	1'360	1'508	2'101	9'053

*) Partitioning based on information from project proposals and therefore deviating from the approved funding ceiling (8'660 kCHF)

5. WORKPLAN AND FINANCES 2008-2011

According to its 10-year business plan, CCES aims and expects to build a portfolio of activities with an overall yearly budget in the order of 25-30 MCHF (including various sources of funding). This would roughly correspond to over 250 new or dedicated people working on CCES projects, strongly increasing the critical expertise in key domains.

Correspondingly, for 2008-2011 CCES plans to:

- approve more projects, with the aim of having 18 active projects yearly;
- approve specific projects jointly supported by CCES and CCEM in topics of common interest, with the aim of implementing a comprehensive vision of sustainability;
- develop research platforms and integrative elements;
- consolidate the administrative and managing procedures for individual projects as well as in the central administration;
- increase the acquisition of third-party funding, with specific emphasis on the EC FP7 calls;
- initiate a more systematic analysis of strengths and weaknesses in the participating institutions;
- strengthen the focus on societal implementation, with more emphasis on the participation of industrial and public partners;
- evaluate with SNF possible channels for the participation of university partners.

All details on CCES can be found at www.cces.ethz.ch/