In 2012 the RAE (Research Assessment Exercise) was performed resulting in rich material about KTH’s research. One of the recommendations from the RAE was that Sustainable Development (SD) should be more strongly integrated into KTH’s research base and education programs. Given the aim that KTH should be one of Europe’s leading technical universities also within the area of environmental and sustainability research, KTH-Sustainability saw a need for identifying present strengths and weaknesses of KTH’s sustainability research and to obtain advice on strategies for the future work in the area. Three reviewers/advisors, Roland Clift, Jacqueline Cramer and Steve Evans, assessed the RAE material from 2012 along with a voluntary one-page update from the RAE-units and conducted a round of interviews with 25 selected units in April 2013.

Roland Clift, Jacqueline Cramer and Steve Evans

14 May, 2013
Recommendations given by the advisors

Interpretation of the concept of Sustainable Development
- The general definition of sustainable development (SD) according to the Brundtland commission (1987) is perceived by researchers as being rather abstract and difficult to relate to their own work. An active and inclusive process facilitated by KTH-Sustainability is needed to enable researchers to interpret the concept of Sustainable Development and apply it to their research so as to contribute to developing the SD research agenda at KTH.

Create lighthouse projects and roadmaps
- A key integrating mechanism is to support the formulation of a small set of grand SD challenges. A grand challenge forms an image of part of a sustainable future that provides focus for projects and plans. An example grand challenge might be ‘the transition to a low carbon Swedish economy’.
- The primary integrating mechanism is multi-disciplinary ‘lighthouse projects’. These bring researchers together to deliver new knowledge that offers the potential to unlock new levels of system performance.
- When creating lighthouse projects a system map of the key variables and interactions in the system to be studied should also be developed. This can only be done by bringing together KTH experts and actively involving them in this creative process. Inputs from industry and from policy and funding agencies should also be encouraged.
- Based on a system level understanding of variables and interactions, the emerging research team should be encouraged to propose technology road-maps that describe a desirable and feasible future vision and a set of projects that can deliver that vision.
- From these two maps the particular research objectives for each project are distilled, which then form the basis for project proposals to outside agencies. We believe that such challenge-led, multi-disciplinary projects are a key research trend and will increase KTH’s impact and reputation.
- KTH-S should allocate a small budget to facilitate the process of defining grand challenges, technology roadmaps and lighthouse projects.

Encourage new and existing staff to participate in challenge-led multidisciplinary research
- The incentive to work on challenge-led, multidisciplinary lighthouse projects is presently lacking.
- Incentive structures should be adjusted to create a positive encouragement to get involved in this creative process.
- Patience, skill and some small funding is needed to enable this critical activity.

Provide compulsory, introductory courses on sustainability and systems thinking
- A KTH-wide course providing a general introduction to sustainability and sustainable development is essential, as a required credit for all students who claim to be engaged in sustainability-related research and available as an option to all PhD students.
- The content of such a course should reflect the KTH institutional interpretation of the sustainability agenda which has yet to be developed and articulated.
- The course would also provide a mechanism to help students involved in sustainability research to meet fellow students with whom they should interact.
- Teaching in systems thinking is also needed, delivered as distinct courses from a module or modules focused on sustainability but designed so that the two areas are complementary and reinforce each other. This taught material should also be required for students involved in sustainability-related
research but some material might be tailored to specific areas of conventional science and technology.

- There is also a specific need for teaching on social aspects and qualitative research, perhaps in the form of an introduction to social research methods.

**Create a PhD meeting place and communicate available courses within SD**

- PhD students appreciate more interaction and communication among themselves – a meeting place for these students should be provided.
- PhD courses related to SD are ill known – make relevant course information available and in time.
- PhD students should be able to take more credits on topics which are outside their immediate specialization; a minimum of 10 credits of electives was suggested by several students.
- Clustering PhD research around “lighthouse projects” should help students to identify and collaborate with students involved in research with similar and complementary aspects and to promote transdisciplinary thinking and research.

**Increase stability for faculty and PhD researchers and encourage multidisciplinary cooperation**

- It is critical for SD research to provide stability in faculty posts so that staff can consider the longer term when developing their research ideas – bringing sustainability research up to average core funding is recommended.
- The funding of activity that ends before the researcher completes their PhD creates a strain on the system and encourages short-term thinking. The chance to request KTH ‘bridging money’ for 3 months should be made available.
- A joint process of preparing research proposals by staff with different disciplinary backgrounds in a creative and cooperative atmosphere is recommended. This could lead to a growing number of multidisciplinary project proposals and also catalyse development of relevant competence. This could also form part of the education efforts in systems thinking.

**KTH-Sustainability’s reflections and recommendations**

KTH-Sustainability will during 2013-2014 initiate following processes recommended by the advisors:

- Facilitating the interpretation of the concept Sustainable Development
- Identifying lighthouse projects together with researchers
- Creating a PhD meeting place and communicating available courses within SD

KTH-Sustainability encourages schools to include a paragraph about sustainable development related to research and education when compiling the development plans and to consider KTH’s environmental goals to 2015:

- KTH:s research about environment and sustainable development shall increase
- KTH shall have research about environment and sustainable development on a high international level.

KTH-Sustainability also encourages schools and central management to:

- Secure that the basic core funding for environment and sustainable research is at least on an average level
- Take the occasion to enforce the environment- and sustainable research when appointing new positions.
- Consider how to create incentives to stimulate to multidisciplinary research.