

Sustainability Section of the EFCE - Position paper

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Vision of the Sustainability Section

The Sustainability Section of the EFCE envisions a sustainable process industry in the European context where economically sustainable companies operate with minimal ecological impact while delivering maximum social benefit through its products and services, as well as providing a safe and inspiring work environment. It also envisions a vibrant innovation climate within the professional community of chemical engineers based on cutting edge research. The Sustainability Section recognizes the pivotal role of chemical engineering knowledge for the transformation of the European society towards sustainable development and foresees a particular role for chemical engineers as scientific as well as societal change agents, supporting this transformation in the economic, social and political arena at the national, European and international levels.

Mission of the Sustainability Section

The mission of the Sustainability Section is:

- to provide a discourse platform within the EFCE on opportunities and challenges that sustainable development poses to the professional community of chemical engineers in Europe;
- to pool the considerable knowledge within EFCE members with regard to a sustainable process industry as well as management of natural resources, environmental protection and socio-economic sustainability;
- to identify and co-operate with key actors and allies to accelerate the transformation of the European society towards a more sustainable development;
- to provide decision makers in business, society and politics with reliable knowledge support based on scientific insight and industrial experience in all fields of interest to the process industry; and
- to educate a new generation of chemical engineers as well as current engineers and decision makers in the process industry to meet the challenges of the transition towards a sustainable process industry.

Sub-sections of the Sustainability Section

The work of the Section will be aligned with the Grand Challenges posed by sustainable development and relevant to the process industry. These are:

1. Grand challenge: Sustainable management of natural resources
2. Grand challenge: Sustainable energy systems
3. Grand challenge: Sustainable food systems
4. Grand challenge: Sustainable chemicals
5. Grand challenge: Measuring sustainability
6. Grand challenge: Sustainability education

Figure 1 illustrates how these Grand Challenges that form the basis for the work of the Sustainability Section fit together.

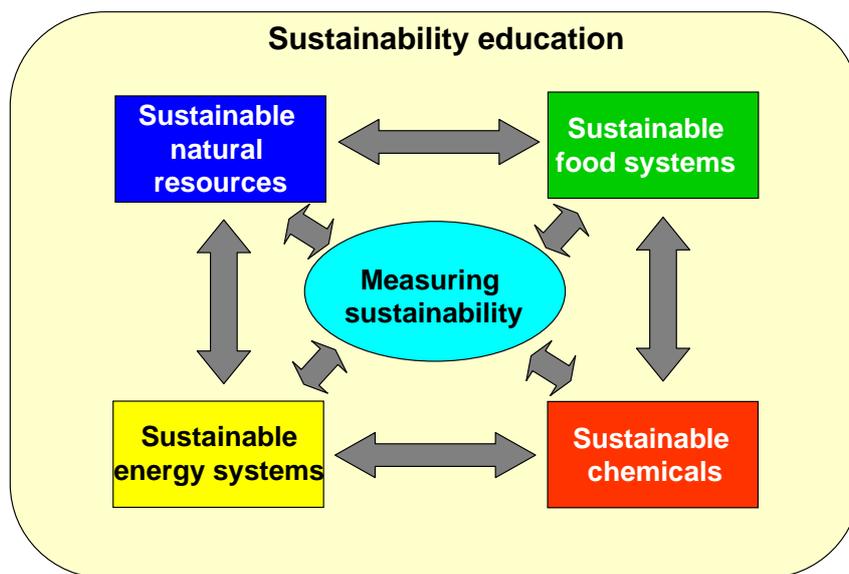


Figure 1. Grand challenges for the Sustainability Section and their interactions

In order to achieve its mission, the Section will have five sub-sections with a clearly defined mission, addressing these Grand Challenges by taking a systems approach. These sub-sections will consist of EFCE members with particular expertise and interest in the field relevant to their respective missions. They will be led and co-ordinated by the sub-section leaders who will be responsible for internal operation and co-operation with other sub-sections where appropriate as well as for co-operation with external organisations and parties.

The sub-section leaders, together with the co-chairs of the Sustainability Section, form the Board of the Section and are jointly responsible for achieving the mission of the Sustainability Section of the EFCE. The Board, which will also include industrial representatives, will periodically review the missions of the sub-sections as well as initiate new sub-sections to ensure a flexible and dynamic response to emerging sustainability challenges for the process industry.

The following sections define the initial mission of each sub-section. As there is an urgent need to move forward all the sub-sections, the initial concrete objectives that should be achieved by CHISA 2014 are also briefly outlined. These initial objectives form the basis on which to build the activities of the sub-sections in future. It is the responsibility of the sub-section leaders(s) to co-ordinate and deliver these objectives with the members of their sub-section.

Sub-Section “Sustainable Management of Natural Resources”

Leader: Prof. Henk van den Berg (University of Twente)

Mission

The mission of this sub-section is to co-ordinate and develop an EFCE position on how to ensure a sustainable resource base for the European process industry. The scope of this sub-section includes sustainable utilisation of mineral and fossil resources that are strategically important for the

European process industry. Also within the scope of this sub-section is water both as a resource for the process industry but also as a common resource that needs to be protected from pollution. Similarly, pollution prevention of air and land is also included. However, bio-resources are explicitly outside the scope of this sub-section as they are considered within the Energy and Food Systems sub-section.

The sub-section will develop criteria for the sustainability of the resource base for the European process industry, taking social, environmental and economic aspects into account. Using these criteria, it will analyse the resource base of the process industry and provide solid decision support for business and political decision makers based on the scientific and industrial experience of its members.

Initial objective

The sub-section will generate a “Red Resource List” from the point of view of the European process industry. This list will flag up those strategically important resources that will either become critically contested or that will be subject to a major shift in their source (e.g. from classical mining to recycling and/or urban mining).

Sub-Section “Sustainable Energy and Food Systems”

Leaders:

Energy: Professor Richard Darton (University of Oxford)

Food: Dr Almudena Hospido (University of Santiago de Compostela)

Mission

The transition of the European energy system as well as the need for sustainable food production will require substantial innovation in the process industry as well as fundamentally new approaches to make these sectors sustainable. Process engineering know-how will be pivotal for reaching the right decisions for sustainable energy and food systems in Europe.

The mission of this sub-section is to make the voice of chemical engineers heard in the European discourse about the need for transformation to more sustainable energy and food systems. Among others, this includes understanding the potential future role of bio-resources and their interactions between and within the energy and food systems as well as their differing processing needs. For example, in energy applications such as bio-fuels, purity may be the aim, but in food systems achieving appropriate nutrition levels may be the goal.

In this context, it is important to work on achieving a solid EFCE position on the process industry in a bio-based economy and in particular on the rational use and processing of limited bio-resources exploiting the whole innovative capacity of chemical engineering research to help towards sustainable use of bio-resources and aligning the often conflicting requirements of sustainable food, energy and bio-based commodity provision.

The wide portfolio of topics of this sub-section must be treated by taking a systems view as they are closely interlinked and difficult to separate from each other. Given the breadth of the field, the sub-section will critically depend on fruitful co-operation with partners outside the EFCE. It is therefore

also an explicit mission of this sub-section to identify these actors, link up with them in an interdisciplinary discourse and contribute to these discourses from a systems perspective inherent to chemical engineering thinking.

Initial objective

As a first objective the sub-section will present a “Roadmap for Sustainable Utilisation of Bio-resources by the European Process Industry” outlining the criteria for rational and sustainable bio-resource utilisation from the point of view of the process industry. This roadmap shall build on the on-going discussions by other organisations (e.g. EFBE, IEA, eseia, etc.) and highlight the opportunities for the European process industry.

Sub-Section “Sustainable Chemicals”

Leader: Prof. John Woodley (DTU)

Mission

The mission of this sub-section is to develop an EFCE position on the sustainability of the products and services provided by the European process industry. This includes identifying and setting criteria for products to be truly sustainable, taking into account their life cycle impacts on the environment, society and economy. It is also a mission of this sub-section to define the innovation requirements for process technology to produce chemicals that fulfil the requirements of contributing positively to environmental, social and economic sustainability in the European context.

Initial objective

The initial objective of this sub-section is to develop a report on “Criteria for Sustainable Chemicals in Europe” that summarizes the on-going discourses about life cycle assessment (LCA), “Green Chemicals”, “White Biotechnology” and related fields like “Industrial Ecology”, “Clean Technologies” and “Zero Emission Concepts” (to name a few) and draw up a list of criteria that can be used to measure the sustainability of chemicals and service provided to society by the European process industry.

Sub-Section “Measuring Sustainability”

Leader: Dr. H. Stichnothe (Thünen Institute of Agriculture)

Mission

Sustainable development can only be achieved if we can measure our impact on the environment, economy and society in the first place. This applies at all levels in society, from individuals, to companies to governments, as well as to different products and services used by society. The mission of this sub-section is therefore two-fold: to help the European process industry measure its sustainability in a harmonised way across the sector and to provide a solid base for the EFCE to enter discourse on sustainability measurement outside the sector but in the areas related to it.

Initial objective

The first objective of the sub-section is to provide a literature review of approaches and indicators currently used for measuring sustainability in industry, with a focus on life cycle assessment (LCA)

approaches. This review will be used as a basis for developing, at a later stage, criteria for measuring sustainability, harmonised across the process industry and taking into account their practical application, relevance and reliability.

Sub-Section Education for Sustainable Chemical Engineering

Leaders: Prof. Kevin van Geem (University of Gent) and Prof. Adisa Azapagic (University of Manchester)

Mission

Sustainable development of the process industry crucially depends on the practicing chemical engineers and will not be achieved unless we educate both the current and future generations of chemical engineers to work and act more sustainably. This is the main focus of this sub-section which will work in close collaboration with EFCE's WP Education.

Initial objective

The first objective of this sub-section is to identify and propose key aspects of sustainability education that should be integrated into the chemical engineering curricula in Europe to equip future graduates with the knowledge, skills and a way of thinking compatible with and leading to sustainable development. Following this and at a later stage, the sub-section will also discuss how continuous professional development courses for sustainability could be developed for current practicing engineers.