The challenges of Life Cycle Sustainability Assessment (LCSA) of energy technologies

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Providing a safe, clean and sustainable energy supply to all world citizens is one of the greatest challenges of this century. Access to affordable energy services is fundamental to human activities, development, and economic growth. Sustainable energy could be defined as the provision of energy that meets the needs of the present without compromising the ability of future generations to meet their own needs. Then, sustainable energy has two main key components: renewable energy and energy efficiency, which are often named the twin pillars of sustainable energy policy. Europe has adopted more ambitious energy-policy objectives to achieve a low-carbon scenario by 2050. In accordance with this issue, the European Energy Research Alliance (EERA) contributes to coordinate a massive public research effort to develop more efficient and cheaper low-carbon energy systems, as one of the cornerstones of the European Strategic Energy Technology Plan (SET-Plan), a tightly focused strategy which aims at accelerating the development and market uptake of this type of technologies. Within the EERA framework of the Joint Programme on Economic, Environmental and Social Impacts of Energy Policies and Technologies (EERA JP e3s), a specific sub-programme working on "A life-cycle approach for evaluating the sustainability performance of energy technologies" was launched in 2013. The aim of this topic is to combine and upgrade existing capabilities and to develop and share the necessary knowledge and tools to evaluate environmental, social and economic impacts of energy systems, from a life-cycle perspective framed into the new concept of Life Cycle Sustainability Assessment. This sub-programme is divided into the following five work packages. Submissions regarding these topics are welcome: 1. Development of advanced indicators for sustainability performance evaluation: Representative indicators must be selected and/or defined in order to evaluate their impacts on sustainability. 2. Development of a framework for LCSA of energy technologies: Conceptual and methodological structure must be developed, putting together life-cycle tools (LCA, LCC, SLCA, LCSA, MFA, SPA), and attributional (aLCA) and consequential (cLCA) approaches. 3. Energy externalities and advanced Input-Output-LCA methodologies: Methodologies to consider sustainable external costs must be studied. 4. Energy technologies supply chain -from production to consumption/use-: New criteria, methods, standards and tools must be developed which serve as a dynamic decision support dashboard to enable balanced and holistic evaluation of various energy technologies supply chain scenarios with production-consumption paradigm. 5. Critical raw materials: New indicators and method for assessing criticality of raw materials need to be further developed; as they play a significant role in the energy technologies supply chain.