

EASAC statement on the need for more emphasis on systems approaches to inform EU policy making



This short statement on the need for more emphasis on systems approaches to inform EU policy making has been developed on behalf of the European Academies Science Advisory Council (EASAC: www.easac.eu) by its Energy Steering Panel. It reflects a series of discussions in the Panel over the last 18 months, and in particular, a workshop held at the Royal Irish Academy in Dublin in September 2012.

In modern society most of our energy is delivered through energy systems that are complex, geographically diverse and have interactions with other (sub)systems, for example the increasing interdependence of electricity, gas supply and transport systems. How these systems are designed and integrated together is becoming more and more important. There are many opportunities to improve the overall performance of energy systems with increased levels of integration, but this comes with significant challenges.

Taking a systems approach entails making an interdisciplinary evaluation of the factors determining the behaviour of the system as a whole, including the transitions required to achieve target energy outcomes, rather than to focus just on its component parts. Only by developing an understanding of how the system as a whole works and is integrated in society can potential synergies between components be realised in practice, and conflicts avoided.

The EU does not place enough emphasis on systems approaches in developing its policies and strategies, rather tending to focus on the development of individual technologies. Consequently, EU policies relating to energy can lack coherence. Similarly, EU energy R&D is still too focused on the development of individual technologies: this will not be sufficient to achieve EU energy targets.

A better understanding is needed of systems dynamics, transitions and integration, requiring an interdisciplinary approach. Systems approaches, and a deeper understanding of systems dynamics, are needed to unlock the promise of individual technologies and integrate a variety of necessary elements to develop highly efficient and resilient new combinations. Systems approaches have to take into account the reception, and integration, of new technologies into society.

An important example is provided by the EU's target to achieve an essentially decarbonised electricity system by 2050. This will require a radically different system, but not enough work is being done on how this system can be made to work, for example, how the individual components of the new system will be stitched together, and how the transition can be achieved. As well as evaluating technologies and undertaking system simulations, a systems approach to analysis of an electricity system dominated by renewable energy sources will consider not only technology and infrastructure but also markets, user practices, knowledge infrastructures, policies, regulations and politics.

Investment in systems research currently accounts for a small percentage of the EU's R&D spend on energy, and should be increased. The benefit to cost ratio of such incremental expenditure on systems research is likely to be substantially higher than technology development, which typically requires high cost experimentation and demonstration. In contrast to Europe, the US Department of Energy is

significantly increasing its emphasis on systems approaches, particularly in respect of the US electricity system.

A specific recommendation for the SET-Plan is to add an ‘energy systems’ platform. This would provide a mechanism for developing integrated social-economic-technical perspectives on the issues of EU energy system development.

Europe has rather limited indigenous supplies of fossil energy, and more constrained options for its energy system, than many other regions of the world, particularly in view of its targets for climate change mitigation. Systems approaches are therefore essential to ensure that best use is made of the resources that are at Europe’s disposal, and to help guide policies to solutions with high societal value and better resource utilisation. They are also inherently able to address the kinds of question of most concern to policy makers, such as how to achieve security of supply, resilient systems etc.