

iiESI London Workshop Summary

Introduction

The objective of the workshop was to explore the value proposition for energy systems integration (ESI). It is a complex issue as the values are not necessarily easily quantifiable, and the domain by its nature is multi-dimensional and multi-disciplinary. Therefore each system is in many respects unique and generalizations are therefore difficult to identify.

The value proposition necessarily concentrated on placing a value on existing developments in the ESI space in particular the transition to an energy system with more variable renewable energy and empowering the consumers. Therefore the outcomes are limited to the shorter term.

Main Themes and Takeaways

The ESI value propositions discussed during the day were by no means exhaustive. However, the themes were Flexibility, Consumers, and Markets.

An overarching theme was the need for an increasingly flexible and smart energy delivery system. **Flexibility** can be provided, for example, by demand side management (across fuels), energy storage (thermal and electrical), combined energy systems (electricity-heat coupling), hybrid heaters, and energy efficiency. This flexibility increase can be valued in energy infrastructure investment deferral, peak capacity reductions, increased asset utilization and customer empowerment.

A considerable portion of the ESI value proposition hinges on successfully integrating the **consumer**. Growth of ESI depends on customer participation in markets, demand side management, and on a higher level, energy consumption as a whole. With consumers at the heart of the energy system itself, allowing customers to interact with energy systems and bring value, will the energy system realize its full potential.

Interestingly quantification of flexibility and the consumer are both notoriously difficult and this highlights the challenge of quantifying the value proposition.

Market design is an important aspect of ESI. Even though ESI offers a techno-economic value proposition, the costs and benefits for individual stakeholders along the value chain may not align. This means that there is not necessarily an ESI value proposition for all individual stakeholders unless new collaborations and business models are developed that better share costs and benefits and therefore support the realization of the full ESI value. Markets must also align with the physics to reveal inefficiencies and send the right investment signals. If done correctly, opportunities to integrate power, gas, and transportation will emerge on energy markets. New market needs include development of multi-energy markets, markets that account for the value of flexibility and benefits to the grid, and markets that reward societal benefits.

The Link between Value Proposition and Policy Development

Having addressed the value proposition of ESI, discussion took place as to how to best display the value of ESI in a tangible way before informing regulators and policymakers. ESI is not only an engineering challenge, but a multi-disciplinary research field that requires contribution from economists and social scientists. This collaboration is essential to translate ESI value proposition to all stakeholders in the energy value chain, and support achievement of long-term policy goals (energy security, affordability and decarbonisation).

ESI projects presented at the workshop, such as RealValue and REIDS, can provide best practices on how to disseminate the ESI value proposition to different stakeholders, in particular to the customer. There is a need to break down the silos of the energy industry and have collaborations between academia, business, and policy. Research should include holistic information that is insightful for businesses and policy-makers, for example: How will it affect the constituents? At the same time, there is a need to align business objectives with those of society.

In terms of integration between countries, ESI needs to reconcile the benefits of international integrations with local and national agenda (e.g. national energy security and zero-carbon cities). Denmark, for example, has set a target to be carbon free by 2050 and relies on international cooperation. ENSTO-E is creating a framework under the help of TSO's and the European Commission that will promote collaboration between academia, business, and government in order to help bridge the gap between value and policy but also between all key stakeholders within the energy industry.

Conclusion

ESI is an expansive, technologically unbiased research field that involves all aspects of the energy sector and encompasses other related, but more limited, research fields such as "low-carbon cities" and "smart grids". ESI marks a shift from incremental to strategic thinking.

iiESi is supporting the development of ESI as a research field, by disseminating findings related to research and demonstration projects. ESI research provides information to all parties, not only about the benefits, but also the threats and risks associated with the integrated nature of energy systems that are currently hidden by silo thinking and silo research. Furthermore, ESI research can support innovation and development by: promoting interdisciplinary research, providing a technological agnostic platform while acknowledging the current energy infrastructure, and fostering new business models and technology development. iiESi sets out to create a more holistic framework through which collaborative ESI research can flourish in order to help achieve long-term policy goals.