

Novel tools and methodological advances in modelling and analysing the sustainability of future energy systems: Outcomes of the SuReTool project

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INTRODUCTION AND GOAL

Future implementation of both conventional and new renewable energy technologies will inevitably result in a substantial increment in the number of plants and facilities deployed. Research into the economic, environmental and social implications of this step-change in technology deployment is required in order to ensure that the evolving energy system is actually sustainable. In this respect, within the framework of the **EEA/NILS Science and Sustainability programme**, the **SuReTool project (006/ABEL-CM-2014)** developed novel tools and methodological frameworks for modelling and analysing the sustainability of future energy systems.

HYPOTHESIS AND METHODOLOGICAL FRAMEWORK

- ✓ **Hypothesis:** the robust integration of life-cycle sustainability indicators into energy system modelling is feasible and enables a comprehensive assessment of energy systems
- ✓ **Life Cycle Assessment (LCA)** of electricity production technologies:
 - Existing and potential future technology options
 - Special emphasis on system boundaries definition to avoid emissions double counting
- ✓ **Energy System Modelling** of the entire energy system at the national level:
 - Focus on electricity production mix and electricity trade
 - Norwegian energy model (optimisation-based, horizon 2050, 5 regions) (IFE)
 - Spanish electricity model (simulation-based, horizon 2050, one region) (IMDEA Energía)
- ✓ **Assessment of life-cycle sustainability indicators (evolved):**
 - Human Health, Ecosystem Quality, Climate Change (IMPACT 2002+)

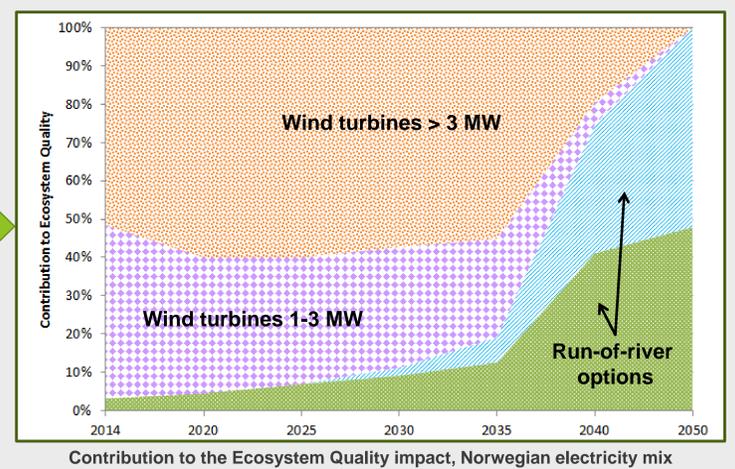


RESULTS

Definition, inventorying and calculation of energy technologies in terms of life-cycle impacts

Modelling of national energy systems and definition of energy scenarios

Endogenous integration of life-cycle indicators into national energy models



Project Period: July 2014 - November 2015

SureTool v1.1: Scenario selection tool for decision and policy-makers

- Instructions and data entry project
- Description of the scenarios and indicators
- Data entry for energy modellers
- Data entry for decision and policy makers

Starting screen of the SuReTool application



International research stays
2 Norwegian, 4 Spanish

Publications in peer-review journals: 1
García-Gusano *et al.* (2016)

Publications in conferences: 2
XXVI SETAC Europe, III Spanish LCA Network

Publications in the media: 2
Madri+d blog on renewable energy

CONCLUSIONS AND PERSPECTIVES

- ✓ Overall, the **interaction between life-cycle and energy systems modelling approaches** is concluded to be **feasible and advantageous**
- ✓ Further joint efforts are still required when it comes to **strengthening the link** between both approaches within a harmonised framework

REFERENCES

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ACKNOWLEDGEMENTS



Supported by a grant from Iceland, Liechtenstein and Norway through the EEA Financial Mechanism. Operated by Universidad Complutense de Madrid.