Integrating sustainable development goals into energy systems modelling

ETSAP Webinar series January – February 2022
<table>
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<th>New energy technologies are needed...</th>
<th>... with non-energy impacts</th>
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<td>Electrification of heating</td>
<td>Direct costs and burdens</td>
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<td>Electrification of mobility</td>
<td>Environmental impacts</td>
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<td>Renewable energy supply</td>
<td>Health impacts</td>
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<td>(Green) Hydrogen</td>
<td>Severe accidents</td>
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<td>CO2 capture, utilisation and storage</td>
<td>Social aspects</td>
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<td>Negative emission technologies</td>
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Energy systems analysis is linked with sustainability assessment.

Energy Systems Analysis at PSI LEA

- Single Technologies: Electricity, Heat, Transport
- Scenarios: Options, Uncertainties, Constraints
- Scenario Modeling (Simulation or Optimization)
- Costs and burdens per unit of energy
- Utilization by Technology
- Direct Costs & Burdens
- Life Cycle Analysis
- Environmental Analysis
- Health Impacts
- Severe Accidents
- Social Aspects
- Internal Costs
- External Costs
- Non-monetized Burdens
- Total Cost
- Multi-Attribute Analysis: Tradeoffs, MCDA Ranking
- Criteria Weights
- Stakeholders
Are electric cars sustainable?

* Cumulative non-renewable primary energy demand results for the entire vehicle life cycle

How green is the hydrogen from gasification? 

EF: Entrained flow gasifier  
SMR: Steam methane reforming  
ATR: Autothermal reforming  
HPR: Heat pipe reformer  

How much is the carbon removal efficiency of Direct Air Capture?

The ETSAP community has performed several model developments and knowledge exchanges, such as:
- Workshop on modelling the water energy nexus (Zurich 2017)
- Workshop on sustainable performance of the energy systems (CIEMAT 2017)
- Workshop on models and applications (Sao Paolo 2017)
- Linking energy systems models and economic models (UCC, 2014)

The main objectives of the three workshops are:
- To analyse methodologies and required data
- To provide insights on the value added gained for policy analysis
- To get insights on synergies and trade-offs between SDGs and energy transition
Wir schaffen Wissen – heute für morgen