ENLENS: Energy Transition Through the Lens of SDGs

Research Priority Area application

1. Title: Data-Driven Optimization of Policy Strategies for Energy Transition and Sustainable Development Methodologies

2. Main applicant: Dr. Jocelyne Vreede (Faculty of Science)
Co-applicant: Dr. Luc Fransen (Faculty of Social and Behavioural Sciences)

3. Societal case

In 2015, the 2030 Agenda for sustainable development was formulated to address economic, environmental and social balance between developing and developed countries[1]. The implementation of this ambitious global agenda by 2030, comprising 17 SDGs and 169 targets, has been among the greatest challenges for United Nations Member States[1]. Since the implementation of the 2030 Agenda, several methodologies have been developed and applied to measure the achievement of the goals and targets[2]. Some examples include the positive and negative interactions with Carbon Capture and Storage technology[3]; synergies and trade-offs in the energy sector[4]; direct or indirect influences on infrastructure system[5]; and the linkages with Life Cycle Sustainability Assessment indicators[6]. Despite these efforts, determining the trade-offs and synergies of the SDGs is still complex due to the difficulty of isolating the impact of one goal without considering its ripple effects on others. The large breadth of the SDGs has prompted the development of assessment methodologies that account for the nuances of diverse geographical scales. Aligning energy transition with the SDGs necessitates acknowledging the interdependence of these scales. In addition, the sustainability of value chains also requires investments and policies that are synchronized over location and time.

4. Scientific case

The guiding question of this proposal is: How can we stimulate the implementation and use of methodologies for energy transition and meet the SDGs, both within the Netherlands and beyond its borders, focusing on trade-offs and synergies among SDGs? We plan to use data science approaches and policy studies to optimize the Value Chain Assessment[7], originally developed to integrates all relevant literature on the green hydrogen transition to characterize its impact on all SDGs. Adding a *data science dimension* to this assessment facilitates a more fine-grained impact analysis of the relevant insights from literature on energy transition, through automated search and machine learning approaches. Adding policy study perspectives provides a stronger measure of the impact of policies devoted to the energy transition and energy value. This methodology can be applied to a broad range of possible value chains (e.g., energy technologies, minerals, and different energy carriers). Its optimization can contribute to measuring the achievement and impacts of the SDGs at different scales and facilitate practical applications for researchers, stakeholders, and decision-makers. Our research will contribute directly and indirectly to all the 17 SDGs and will be made available to the UvA community, policymakers and practitioners.

5. Contribution to the aims and success indicators of ENLENS

A. *How will your project evolve after the proposed research/activity. What is the long-term goal? (ENLENS aims at initialization of new activities that may carry on thereafter (seed-money)*

The PIs will pursue a collaborative academic publication after sharing the initial results of the study online and will investigate further funding opportunities for a larger project, most likely

within the NWA or the Dutch Climate Research Initiative. The collaborative efforts between the Faculty of Science and the Faculty of Social and Behavioural Sciences hold the potential to foster the utilization and application of diverse tools across faculties, serving as an example of integration. Furthermore, the results of this project can contribute to the dissemination of new methodologies for energy transition and enable meeting the SDGs.

B. *Why and how does your project contribute to the UvA-community of interdisciplinary research, and ENLENS more specifically?*
The project is intrinsically interdisciplinary due to its use of a wide range of scientific insights to establish SDG impacts, trade-offs, and synergies. This project furthermore provides the opportunity for integration of data science, policy studies and broader SDG studies. The proposal will enable more extensive engagement with methodologies that may prompt the UvA community to contribute to the SDGs more strongly.

C. *ENLENS aims at broadening the community beyond the group of project PIs. Describe how your project will contribute to this goal.*
The integration and dissemination of data sciences and policy studies for energy transition and SDGs are crucial. The interdisciplinary application of the methodological tools is first disseminated within the networks of the PIs at UvA (data science in chemistry and social and behavioral sciences). The PIs will also use their contacts within the expertise centre of the Responsible Business Conduct Lab to disseminate to government and civil society representatives. In addition, we will invite policymakers and practitioners when workshopping the first draft of our study.

6. Budget
The budget will be spent as described below:

Faculty of Science (€ 15.000)	
Researcher assistance	€ 12000
Online dissemination	€ 2000
Workshop	€ 1000
Faculty of Social and Behavioural Sciences (€ 15.000)	
Researcher assistance	€ 15000
Data acquisition/preparation	
Software/website	€ 5000
Total budget:	**€ 35000**

7. References

[1] United Nations, *Transforming Our World: The 2030 Agenda for Sustainable Development* (2018).
[2] J.D.. Sachs, G. Lafortune, G.. Fuller, and E. Drumm, *Implemeting the SDG Stimulus. Sustainable Development Report 2023.* (Paris, Dublin, 2023).
[3] T. Mikunda, L. Brunner, E. Skylogianni, J. Monteiro, L. Rycroft, and J. Kemper, Int. J. Greenh. Gas Control **108**, 103318 (2021).
[4] F. Fuso Nerini, J. Tomei, L.S. To, I. Bisaga, P. Parikh, M. Black, A. Borrion, C. Spataru, V.C. Broto, G. Anandarajah, and B. Milligan, Nat. Energy **3**, 10 (2018).
[5] P. Murray, The Role of Power-to-X Technologies in Decentralised MultiEnergy Systems, Eth Zurich, 2020.
[6] J.G. Backes and M. Traverso, Curr. Opin. Green Sustain. Chem. **38**, 100683 (2022).
[7] D. Peyerl and B. van der Zwaan, Sci. Reports - Nat. (2024). (Submitted)