

1 Energy transition through the lens of SDGs

2 Summary

The urgent need to rapidly reduce carbon dioxide emissions to avoid uncontrollable climate change and fulfil the requirements of the Paris Agreement shapes decisions on how to define, design, and implement the energy transition in the Netherlands. The energy transition is closely intertwined with essentially all Sustainable Development Goals (SDGs), but its wider effects are seldom taken into account or studied in detail. UvA has excellent researchers in many disciplines, working on economic, environmental, technological, social, political, and business aspects of the energy system, the energy transition, and SDGs. However, while the added value of interdisciplinary research has been widely acknowledged, it has been very difficult to pursue until now.



The aim of this research priority area (RPA) is, therefore, to stimulate and initiate interdisciplinary cross-faculty research that maps the energy transition in the Netherlands and Europe against the SDGs beyond Dutch borders. This RPA will provide seed money for joint cross-faculty initiatives to generate new opportunities for researchers to apply their expertise in an interdisciplinary approach, and develop joint proposals for external research funding. The RPA will specifically address tenure trackers, assistant professors, and newly appointed staff. Participating in the RPA will help them developing their scientific network across UvA faculties as well as creating new networks with public, non-profit and private stakeholders. The most important success indicator of the RPA is the establishment of a lively interdisciplinary community, which organizes regular meetings that lead to innovative ideas and new cross-faculty initiatives, both within UvA and with external partners and funding.

Now that the Netherlands and the European Union have made a start with the implementation of the energy transition, and have formulated ambitious goals for achieving substantial greenhouse gas emission reductions over the next three decades, including carbon neutrality by 2050, it is becoming apparent that the domestic energy transition may generate a broad range of impacts around the world that relate to essentially all SDGs, also other than those on energy and climate change themselves. Today, it is thus becoming pertinent to investigate these impacts (both negative and positive) from a global perspective – that is, before the energy transition is fully implemented in the Netherlands and Europe, and before we potentially will have created new large-scale externalities or technological lock-ins as under the fossil fuel energy model. The goal is to preclude undesirable side-effects and stimulate possible co-benefits for comprehensive sustainable development around the globe. Interdisciplinary research on the possible trade-offs and synergies associated with the energy transition can play an essential role in reaching that goal.



3 Scientific case

In 2015, the UN agreed on 17 SDGs to meet the most urgent economic, environmental, political, and social challenges that humanity is facing. The energy transition is anchored in SDG7 “*Ensure access to affordable, reliable, sustainable and modern energy for all*”, but is also heavily motivated by SDG13 “*Take urgent action to combat climate change and its impacts*”. In the Netherlands, energy is generally affordable and reliable, hence the energy transition aims first and foremost at transforming our present energy system into a more sustainable one, notably by achieving net-zero CO₂ emissions by the middle of the century.

Because of atmospheric mixing, reducing the CO₂ concentration is pre-eminently a global challenge, while decisions with respect to the implementation of the energy transition are mostly taken nationally. The impact of climate change mitigation measures is commonly calculated as the level of decrease of CO₂ emissions (the goal) and, in the best case, weighed against the costs associated with these measures, such as the financial investment requirements as well as the impacts on the economy and the environment. Externalities (‘hidden’ environmental and social impacts of production and consumption) are often not taken into account, especially when they relate to effects beyond the Dutch and European borders. What are the externalities of technologies that are suggested for implementing the energy transition? What is the full life cycle of wind turbines, solar parks, and batteries? What are the environmental and social impacts of the mining of e.g. lithium and platinum for the production of batteries and fuel cells, or of the increased mining of copper and rare earth elements for solar cells and wind turbines? What are the social, ethical and geo-political effects of becoming dependent on resources originating from countries with weak human, workers’ and environmental rights and protection? In short, how to prevent a repetition of the weaknesses, errors and injustices of the past, and use the energy transition to contribute to meeting the SDG targets in parallel.

The aim of this RPA is to stimulate and initiate interdisciplinary research that generates new knowledge on the ways in which national and local energy transition decisions produce externalities elsewhere from an economic, social, environmental, ethical, and political perspective. The energy transition is highly intertwined with essentially all SDGs. Because synergies and trade-offs are context-dependent, national or local energy transition plans and decisions will be taken as starting points and their impacts on SDGs beyond the Dutch border will be analyzed. The scientific aim is to develop operational energy transition solutions that create synergies between local measures and distant SDG targets.

To reach these aims, this RPA is designed to create new interdisciplinary collaborations through a large diversity of small, innovative, and cross-faculty projects as explained under 4 and 5. The projects P1-P3, summarized below and fully described in appendix 1, are sketched as indicative short examples of projects that would meet the application criteria. These projects, in which Governing Board members are involved, will help launch the RPA right from the start. A Postdoc will study and develop methodologies to assess synergies and trade-offs between the energy transition and SDGs. Furthermore, the RPA’s cross-faculty Governing Board, together with a philosopher of science, will stimulate and guide the challenge of interdisciplinary co-creation and methodology development throughout the duration of the RPA.

P1. Hydrogen across borders? (FdR, FEB, FNWI) Hydrogen is a promising key energy carrier for the energy transition (SDG7, 13). Because of higher solar irradiation levels in Northern Africa, it could be beneficial to produce renewable hydrogen there and import it rather than producing it at higher costs in Europe. If institutionalized properly and equitably, Northern Africa’s hydrogen production



can support developmental goals in the region, by reducing poverty, improving health and education, and providing affordable energy (SDG 1-4). By studying this case and its interrelated interdisciplinary dimensions, this project exposes the potential synergies and trade-offs of cross-boundary multi-actor partnerships with an eye to generating useful insights for policymakers and practitioners (SDG 17).

P2. Mining for energy transition (FGw, FNWI). The energy transition causes an inevitable expansion of open-pit mining to fulfill the growing demand of rare earth elements and critical metals for use in batteries (e-bikes, cars), magnets (wind turbines) and solar panels. Especially in the ‘Global South’ open-pit mining causes major environmental and social problems. In an orchestrated project with BSc and MSc students from the two faculties, we aim at a sustainable transition towards renewable energy (SDG7, 13). With field work and remote sensing and in close collaboration with local stakeholders, we will study how conditions for mining can be optimized to limit environmental impacts (SDG14, 15) and to reduce inequality and injustices in resource countries and between resource countries and the Netherlands (SDG1, 10, 16).

P3. How much biomass for the Dutch heat and electricity sector – and which, from where? (FNWI, FMG). Biomass may play a critical role for heat and electricity generation, however, the composition of fuels in a net zero CO₂ emissions energy sector is highly uncertain, involving vastly different projections of biomass demand in 2050. As most biomass used in the Netherlands is imported, the future development of biomass demand has global implications for food security (SDG2) and aquatic and terrestrial biodiversity (SDG14&15). Accounting for the space and resource constraints, technological innovations, and the socio-political dynamics driving future biomass demand in the Dutch heat and electricity sector, this project develops a social-ecological-technological systems (SETS) approach to analyze the governance arrangements that could adequately address tradeoffs and synergies across the SDGs and along the entire supply chains.

Methodologies: Although it is broadly understood that SDGs are closely intertwined, there are very few studies dedicated to the connections between the energy transition on SDGs other than SDG7 and SD13. The scientific literature shows a broad range of methodologies to assess the synergies and trade-offs between SDGs, such as Environmental or Sustainability Impact Assessment, (Social) Life Cycle Assessment, Interaction Mapping, Multicriteria Decision Analysis, Value Chain Analysis, or SWOT analyses. Although these methodologies seem to fulfil some of the needs for broad and global overviews, they may not be apt for designing local energy transition decisions and assessing their distant, so called “tele-coupled”, externalities. Therefore, a Postdoc will study existing methodologies and further develop methodologies to assess synergies and trade-offs of SDGs in relation to the Dutch energy transition. The Postdoc can thus provide methodological support to the granted projects in assessing and weighting the externalities; projects will mutually serve as cases to apply, test, and fine-tune the methodologies. The projects will provide the expert knowledge, context, and specific information to further develop the framework and make it more robust.

A **Philosopher of Science** (PoS) (Dr. C. Tromp, multi-year project with 0.1 fte/y time investment) will contribute to building a new interdisciplinary community, involving researchers from divergent disciplines such as natural sciences, law, humanities, psychology, political science and economics. These disciplines, all relying on terminology, assumptions, concepts, theories, and methods, don’t necessarily have much common ground and sometimes even appear to be diametrically opposed. To enhance the communication within ENLENS, the PoS will monitor potential barriers for inter- and transdisciplinary collaboration. The PoS joins project teams to identify and tackle problems and help develop mutual understanding. Overarching issues will be addressed in ENLENS workshops. The



overall aim is to support the integration of the knowledge, approaches and solutions in the interdisciplinary UvA community.

4 Organization and institutional context

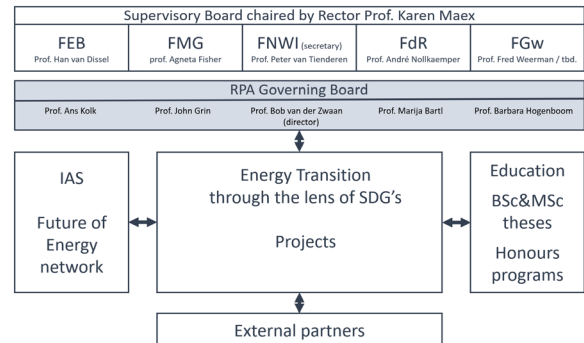
It is the ambition that the Energy Transition Community at UvA will grow - in which case the organizational structure may need to change - but for a start the structure of the RPA will be kept as simple as possible. Each of the five faculties is represented in the Governing Board (GB; director Van der Zwaan) that is responsible for publishing the calls and selecting the projects that receive support. GB members will also connect faculty initiatives (research and education) to the RPA.

The Institute for Advanced Study (IAS) is a perfect neutral place to connect researchers of different faculties. IAS will foster the organization of presentations and workshops as part of the recently-established UvA-wide Future of Energy (FoE) network, and will develop and maintain the RPA website (all active and past projects and network activities will be shown). The Postdoc can assist the Governing Board and IAS in these activities. RPA grants are not provided for curriculum development. But as there is an UvA-wide wish to include sustainability in more courses and programs, this RPA will stimulate to create a direct link between research and education. Students from a broad range of educational programs can get involved in research on energy transition and SDGs through their BSc or MSc theses, projects, or (Honours) courses or research results can be disseminated through lectures in courses.

There are several other SDG-related activities and organizations within UvA such as the CSDS, ASF, IAS, Sustainalab and new sustainability activities as part of the “UvA Instellings Plan” (IP). Alliances will be established to collaborate on joint goals such as: to stimulate interdisciplinary research in overlapping scientific domains; scientific and stakeholder network development; exchange of information on activities, including mutual reference to websites; and, most importantly, contributing to the UvA profile of Sustainability. Members of the Governing Board sometimes already participate in these organizations (or are stimulated to do so) and will thus be the point of contact.

Call and selection criteria

The RPA aims at stimulating new initiatives and should not create yet another complicated and time-consuming procedure to select them. Therefore, short proposals, very clear criteria, high success rate, and useful feed-back will characterize the procedure (an application form and the criteria are given in Appendix 2). A call will be launched twice per year. All granted projects will be described on the FoE website and will be presented to a larger public when finished, in the FoE seminar series. Proposals can range from jointly writing a review paper, doing a feasibility study, developing a research proposal, literally “seed” money as matching to obtain external funds for new research, etc. These projects are preferably starting points for longer, more sustainable collaborations that may develop, for example, into larger projects with multiple PhD’s as part of the UvA-IP, NWO or EU projects. Financial support for a project is maximized at 15 k€ per faculty and potentially another 15 k€ for data support (data acquisition/management/analysis) with a maximum of 45 k€ per project. The Postdoc will be available for providing methodological support.





5 Talent case

As a broad university, UvA is ideally positioned to develop interdisciplinary research, like the field of *Energy Transition through the lens of SDGs*. UvA has excellent researchers in many disciplines, working on economic, environmental, technological, social, political and business aspects of the energy system, the energy transition and SDGs but forces need to be joined. While the added value of interdisciplinary research has been widely acknowledged (see e.g. UvA's White Paper on Sustainability), it has been very difficult to pursue until now, and UvA's disciplinary expertise on these topical issues that are high on the policy and research agendas have not been leveraged systematically yet. To stimulate crossing the boundaries of faculties and disciplines, this RPA aims at initiating new cross-faculty collaborations by providing seed money for joint initiatives in the context of the energy transition through the lens of SDGs. This will generate opportunities for researchers to apply their expertise in an interdisciplinary approach. The call will specifically address tenure trackers, assistant professors, and newly appointed staff. Participating in this RPA will help them developing their cross-faculty network within UvA and their networks with local public and private stakeholders. By linking to education, activities will be further sustainably embedded in the UvA-organization and its faculties.

Applicants who have obtained a grant through this RPA are expected to contribute to the development of the community by helping others to find the right partners, reviewing research proposals for external funding, such as NWO and EU proposals, drawing attention to the RPA in their own faculty, signaling of opportunities in education, and contributing to internal (UvA) and external outreach.

6 Innovation and valorization

The most innovative aspect is that the RPA focusses on the externalities beyond the Dutch and European borders. However, how local energy transition decisions impact the broad scope of sustainable development targets across the world, i.e. in a "tele-coupled" fashion, is seldom studied. An RPA that aims at assessing the distant impacts of Dutch and European energy transition decisions can contribute to a more responsible society.

The RPA projects will actively engage external stakeholders. RPA-contacts already have been created with, and interest has been shown by, the 'Gemeente Amsterdam', the Impact Institute, the JC Arena. It is our intention that many more will follow as soon as the RPA has started. External contacts will be beneficial for student internships and student entrepreneurship.

A thriving interdisciplinary community with a focus on the energy transition through the lens of SDGs will contribute to the challenges of "sustainable prosperity" and "resilient and fair society", mentioned in the UvA Strategic Plan 2021-2026. RPA seed money and activities will also build knowledge and community in UvA, and enhance the potential and visibility of the UvA's research on both energy transition and the comprehensive SDGs.

7 Expected outputs

We expect a broad range of deliverables that may vary among the projects, including for example:

- Cross-faculty interdisciplinary collaboration



- Active participation in the Future of Energy network
- Well-developed projects
- New contacts within UvA or beyond
- NWO or EU project proposals
- New external projects with stakeholders
- Scientific results, presented at the Future of Energy seminar series
- Scientific publications
- Students of different educational programs participating in interdisciplinary research
- Other spin-off to education (e.g. contribution to content of interdisciplinary courses)
- Outreach of sustainability research of UvA
- Presentations, infographics, blogs, vlogs/videos and podcasts for stakeholders and wider public

Most projects will have multiple outputs (as mentioned above) but will not necessarily cover all.