Graduate School
of the Reiner Lemoine Foundation
on Energy System Transition

Concept: June 2019

REINER LEMOINE STIFTUNG

"Reiner Lemoine Foundation wants to support the energy system transition scientifically. A graduate school offers a wonderful opportunity to continue the successful scholarship program of RLS. We are looking forward to committed and motivated scholarship holders who are driving forward the energy system transition in the spirit of RLS! "

Dr. Annegret Jatzkewitz – Chairwoman of Reiner Lemoine Foundation

Content

1. RLS-Graduate School: Research for the Energy System Transition

Since its foundation in 2006, Reiner Lemoine Foundation (RLS) has supported around 100 PhD candidates with scholarships in the field of renewable energy, thus contributing to research into solutions for the energy transition. From 2020, the proven scholarship program will be continued in the form of the RLS-Graduate School. Instead of individual dissertation topics, the School aims to create a group structure that enables synergies within the dissertation topics, creates a supportive and challenging working environment with direct supervision and unfolds a high external impact. It is entitled "EnergieSystemWende" and intends to help to better understand and overcome systemic obstacles to “Energy System Transition” in order to make an energy system with 100% renewable energy possible.

2. Background and Motivation

Climate protection and the related decarbonisation of energy and heat supply as well as of the transport sector are among the most urgent global tasks to preserve our natural environment and resources and to enable sustainable development. Germany has committed itself to these tasks and agreed to the Paris Agreement on Climate Change in 2015, in which the participating states commit themselves under international law to keep global warming well below 2°C. An essential key to this is the use of renewable energy technologies[1].

As early as the 1970s, a growing environmental and anti-nuclear movement began to call to shift away from coal and nuclear energy towards renewable energy in Germany. The term "Energiewende" (energy transition) was established for this transformation by the book "Energiewende - Wachstum und Wohlstand ohne Erdöl und Uran" ("Energy transition - growth and prosperity without oil and uranium") published by the Öko-Institut in 1980[2]. This transition of the energy system was brought forward above all by the introduction of the German Renewable Energy Sources Act (EEG) in 2000. Despite its early efforts, Germany is now threatening to miss its climate protection targets for 2020, as the expansion of renewable energy has slowed down significantly[3]. Energiewende has clearly come to a standstill in recent years.[4]. But Germany and the entire world cannot afford a faltering Energiewende.

The reasons for the slowdown in this energy system transition lie in the increasing number of systemic conflicts. In the transition from centralised and conventional energy supply to decentralised, sectors-coupled and renewable energy systems, structural barriers exist that need to be overcome. This goes hand in hand with the necessity to question the meaningfulness of paradigms and regulations of the conventional energy system and, if necessary, to replace them with new regulations that meet the requirements of the renewable energy system. Only a resolution of the systemic conflicts can accelerate the Energiewende again and bring in the same time a cross-sectoral heat and transport transition. In short: the energy transition – Energiewende - must become an energy system transition - Energiesystemwende!

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[1] Intergovernmental Panel on Climate Change IPCC (2018): Global Warming of 1.5°C, Summary for Policymakers. IPCC, Genf.

[2] Öko-Institut (2019): Energiewende in Deutschland: Definition, Ziele und Geschichte, Freiburg, Mai 2019, URL: http://www.energiewende.de/start/, aufgerufen am 14.05.2019

[3] Umweltbundesamt (UBA) (2019): Indikator: Emissionen von Treibhausgasen. URL: https://www.umweltbundesamt.de/indikator-emission-von-treibhausgasen, aufgerufen am 14.05.2019

[4] Bundesministerium für Wirtschaft und Energie (BMWi) (2018): Erfahrungsbericht nach § 97 EEG (EEG-Erfahrungsbericht), URL: https://www.erneuerbare-energien.de/EE/Redaktion/DE/Downloads/bmwi_de/eeg-erfahrungsbericht.pdf?__blob=publicationFile&v=4, aufgerufen am 14.05.2019

In the spirit of its founder, Reiner Lemoine Foundation has decided to further scientifically support and accelerate this energy system transition by funding a Graduate School. The content and administrative details of the RLS-Graduate School are explained in more detail below..

3. Details on the Content of the RLS-Graduate School

The thematic focus of the RLS-Graduate School is based on the postulated necessity of the Energy system transition and the research needs and hypotheses are derived from it. The overarching main question of the RLS-Graduate School is how central systemic obstacles to the energy system transition can be overcome.

The energy system and its characteristics are decisively influenced by factors in the dimensions of environment, technology, economy and society. The basic prerequisite for a successful Energy system transition is therefore the consideration of all these fields. This is to be addressed by RLS-Graduate School and the respective PhDs, whereby the ecological requirements in the sense of comprehensive decarbonisation are a prerequisite. Therefore, the focus is set on:

- ***Technology:*** The technology sector addresses the technical possibilities for decentralised and cross-sectoral generation, transmission, storage and use of renewable energy. Technical solutions do not focus on the specific improvement of individual technologies, but on the systemic perspective.
- ***Economy*****:** The economic sector refers to economic and market-specific aspects of the Energy system transition. The framework conditions, incentives, tariff and market models and cost-benefit analysis of the Energy system transition fall into this field.
- ***Society*****:** The field of society concerns the social and societal interrelations and aspects of Energy system transition. The socio-economic challenges of the transformation processes, the initiation of people's energy cooperatives, fair distribution of costs and benefits as well as acceptance, participation in decision-making processes and participation in financing should be in the foreground.

In addition, the following major **trends** are currently emerging, the progress of which will have a considerable influence on the Energy system transition:

- ***Sector coupling***: The linking of the electricity system with the heating sector and the transport sector is becoming increasingly important in order to leverage synergies and achieve a comprehensive decarbonisation of all three sectors.
- ***Decentralisation***: The central energy system with large power plants, high-voltage and medium-voltage networks and end-consumers is increasingly developing into a decentralised system with decentralised generation and distribution directly to the consumers.
- ***Flexibilisation***: Due to the high share of renewable energy, the energy system must be controlled more and more flexibly, taking into account spatial and temporal aspects of the feed-in and payments of renewable electricity.
- ***Digitalisation***: New digital technologies enable faster control and communication between the components, but also between participants in the energy system.

The following figure summarizes the structure, dimensions, trends and possible related research questions of RLS-Graduate School.

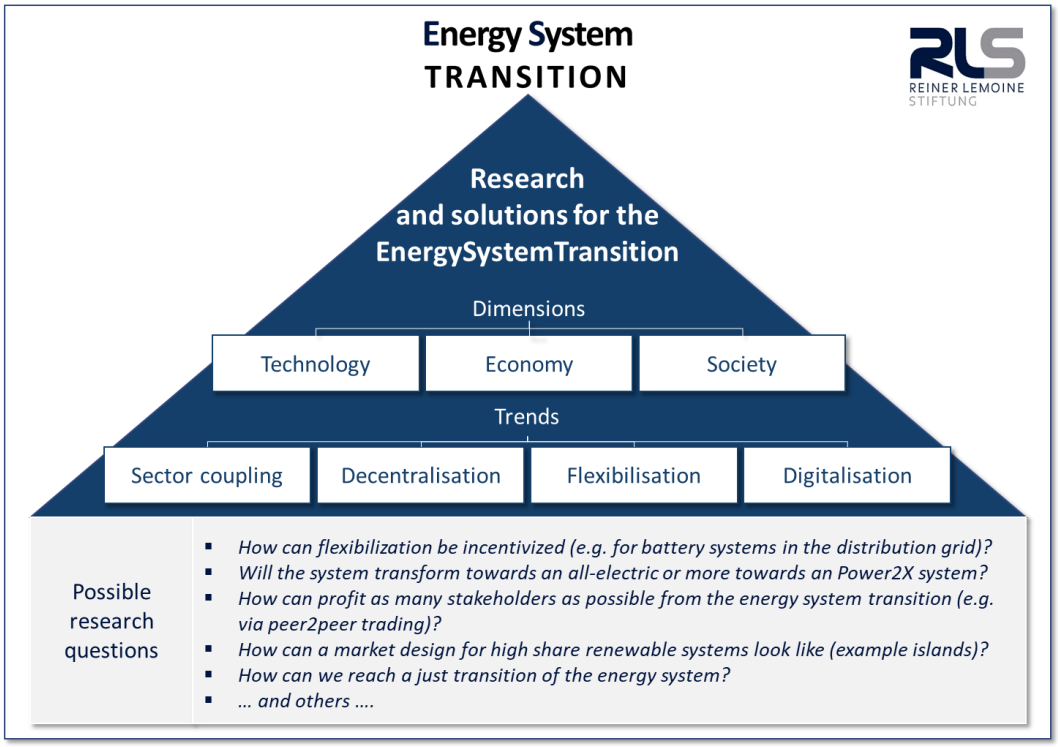

Figure 1: Structure of the research group and examples of possible research questions

4. Research Questions and Topics

We are looking for PhD-projects that deal with overcoming systemic obstacles to the energy system transition in Germany and consider at least two of the above-mentioned fields of the energy system transition. The societal or also social field is to be particularly emphasized in the research projects. In addition, at least one of the above-mentioned major trends needs to be addressed in the respective research problem and questions. Figure 1 shows exemplary questions that can serve as inspiration for the individual PhD-projects. International use cases for the research projects can also be used for the questions as long as a feedback to the German energy system transition can be derived. In the case of German use cases, in return, attention should be paid to global applicability. Climate protection and energy system transition are global challenges that must also be considered globally.

In summary, the content description of the Graduate School is intended to provide a framework for the planned PhD-projects that offers the individual applicants sufficient scope to contribute their own ideas, but is close enough to enable a link to the joint Graduate School after selection of the PhD-projects. The core objective is the development of solutions for the German energy system transition.

In order to sharpen the focus of the applications with regard to the thematic structure of the Graduate School, a content questionnaire will be provided (cf. chapter on application and contact). The selected PhD-projects will be jointly sharpened and harmonized at the beginning of the funding period in order to form a final concept for RLS Graduate School.

5. Structure of RLS-Graduate School

The Graduate School will consist of four PhD-positions and one management position. The Graduate School will be operationally located at Reiner Lemoine Institute (RLI) and led by Dr. Philipp Blechinger. PhD-candidates receive administrative support from RLI and supervision and support from the management and student assistants. The respective professors for each PhD-candidate provide the formal and further supervision individually. The individual projects are to be linked in terms of content and / or methodology in order to achieve high synergies within the Graduate School. The primary goal of the PhD-candidates is to achieve their academic degree (doctoral degree) in the field of energy system transition.

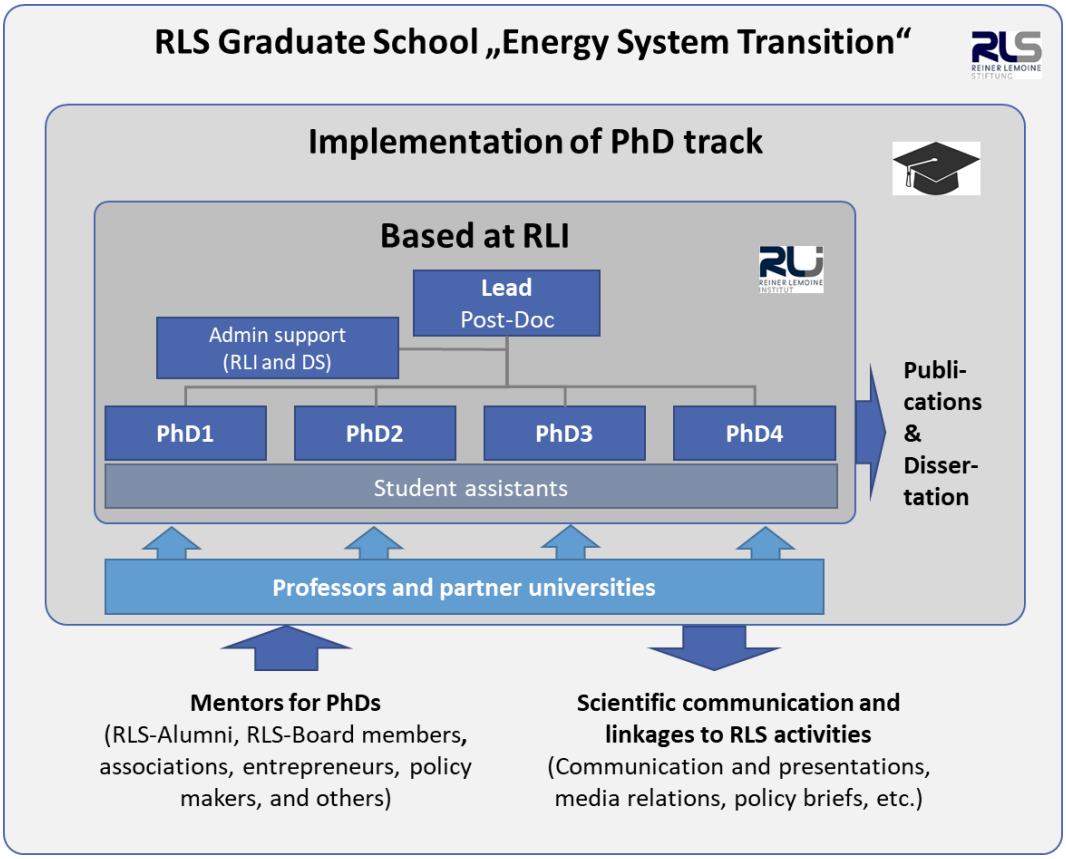

Figure 2: Operational and scientific structure of RLS-Graduate School.

The research should be action- and solution-oriented. This means that solutions and recommendations for concrete action for the energy system transition are developed, which are already discussed and further developed in the research process in exchange with practice. The PhD-candidates will therefore be supported by mentors who will accompany the project. The mentors, on the one hand, come from the ranks of the RLS, i.e. board members and former scholarship holders, and, on the other hand, from practice. To this end, actors from associations, politics and companies are to be recruited who are close to the content of the respective PhD-projects. It is also possible to link the work of the Graduate School with other activities of RLS and to use the corresponding communication channels. Figure 2 gives an overview of the operational and scientific structure of RLS-Graduate School as well as the integration of the School into the overarching activities of RLS.

6. Application and Contact

The application for a PhD scholarship and thus for a place in RLS-Graduate School takes place in two steps: The first step is a written application, the second step a personal selection interview. The deadline for submission of the written application documents is 25th of August 2019. The selection interviews will take place on 26th of September 2019 in Berlin.

Details on the application documents, the administrative background and the application process can be found here: https://www.reiner-lemoine-stiftung.de/aktivitaeten/#graduiertenkolleg

Please note that RLS-Graduate School targets on applied research and policy advice addressing German stakeholders in the field of the Energiesystemwende. A good command of German is therefore a strong asset for any applicant. Thus, the application instructions can be found in German only, while the application documents can be submitted in English or German.

In case of content related questions, it is possible to arrange a brief appointment with the head of the Graduate School, Dr. Philipp Blechinger, before submission (max. 30 minutes). For administrative questions, please contact Lutz Ploettner. Fabian Zuber can answer general questions about RLS.

Dr. Philipp Blechinger Head of RLS-Graduate School philipp.blechinger@rl-stiftung.de Phone: +49 30 120 843 440	Lutz Ploettner Administration – Responsible for RLS ploettner@stiftungsagentur.de Phone +49 2131/ 52513-61	Fabian Zuber Project manager of RLS „EnergieSystemWende“ fabian.zuber@rl-stiftung.de Phone: +49 30 236 178 90

7. The Reiner Lemoine Foundation

100 % renewable energy! Driven by this vision, Reiner Lemoine has worked hard to help the Energy Transition achieve its breakthrough. He was convinced that both, the environment and society, would benefit from the technical innovations in wind and solar energy. Reiner Lemoine Foundation (RLS), founded in 2006, continues the life's work of its name giver. RLS has so far supported science and application-oriented research in the field of renewable energy with around 10 million Euros. RLS has awarded almost 100 PhD scholarships. With Reiner Lemoine Institute, it has established a renowned research institute. RLS thus contributes supporting the energy system to further expand renewable energy.