

**Proposal for a master thesis****“Which eggs in which baskets? Evaluating risk and return of renewable energy based power generation portfolios”**

The last decade saw a vast diffusion of renewable energy (RE) technologies. This diffusion was fueled by policies which reduced the market risks of these technologies and/or improved their profitability. The success story of RE technologies is likely to render these policies obsolete within the next years exposing RE technology operators to market forces.

The phase-out of support policies will have major implications for RE technology operators since the most prominent RE technologies, wind and solar PV, are not dispatchable and lack the possibility to optimize yield through improved dispatch strategies. Most RE technology operators therefore need to diversify their portfolio in order to maintain their profit and hedge their investments against volatile market prices and weather conditions. In general, RE technology operators can diversify their portfolio on a geographical and on a technological dimension. The benefits of either dimension are, however, underexplored so far.

This master thesis should shed light on the question *what is the impact of regional and technological diversification on risk and return of RE-based generation portfolios*. The thesis shall apply modern portfolio theory and evaluate the risk and return characteristics of portfolios composed of different technologies such as wind, solar PV, biomass and demand response at different locations within Germany. The quantitative model build within the scope of this thesis will enable a better understanding of the pressing issues of firms within the power sector and will provide important recommendations for both firms and policy makers.

The student's main tasks will comprise (preliminary):

- Perform a literature review on studies that investigate the performance of power technology portfolios
- Develop a model that evaluates the economic performance of RE-based generation technology portfolios
- Define meaningful scenarios and analyze the sensitivity of the model parameters
- Reflect on modeling results and derive implications for theory and practice

The thesis will provide the basis for a publication in a peer-reviewed journal and may be presented to a larger audience at international conferences. We are looking for an excellent student who is highly motivated and is able to work independently. Strong communication and project management skills are essential. Background knowledge of the energy sector and modern portfolio theory, as well as modelling experience with Matlab or similar software are important assets.

The Group for Sustainability and Technology (SusTec, [www.sustec.ethz.ch](http://www.sustec.ethz.ch)) has undertaken various studies that addressed policy makers and firms in the power sector. The student will be an integral part of the research team and will be supervised by one PhD student and a post-doctoral researcher.

Are you interested? Please send your CV, a short letter of motivation (max. one page) and transcripts of previously obtained degrees (with grades) to Simon Sinsel ([ssinsel@ethz.ch](mailto:ssinsel@ethz.ch)). Applications from non-ETH students are welcome. The approximate duration of the thesis will be six months and shall start in the beginning of 2018.

We look forward to receiving your application!

Zurich, September 2017