Material use in a low carbon energy system

We are looking for 1-2 Master thesis students to conduct a thesis project aimed at assessing how the processes of transforming the Swedish and European energy system will affect the patterns of production and consumption of materials

1 Background

Improved performance and rapidly decreasing costs in areas like renewable energy production, electricity storage and electromobility makes an energy system completely powered by renewable energy sources seem to be within reach.

However, rapid and large scale deployment of renewable and low carbon technologies on both the supply side (e.g. solar panels, wind turbines, transmission) and the demand side (e.g. electric vehicles, battery storage) of the energy system will have impact on the use of natural resources, both energy resources and material resources. This project will explore and analyse how, given different scenarios for the development of a EU renewable energy system, scaling up and sustaining a low-carbon technological system will effects material use. Previous studies have focused primarily on the role of critical minerals in a low-carbon transition. This work will widen the scope by including in the analysis also the use of bulk materials such as steel and cement/concrete and new innovative materials.

The project will feed in to the The Mistra Carbon Exit research programme which has the aim to analyse and demonstrate how the supply chains of buildings, infrastructure and transportation can be transformed to comply with the Swedish target of net zero greenhouse gas (GHG) emissions by the year 2045.

2 Aim and method

The project is aimed at developing methods to assesss how the processes of transforming the European energy system may affect the patterns of production and consumption of materials – including bulk materials such as steel and cement and new innovative materials.

More specifically, the project will involve:

- Litterature review
- Development and implementation of a scenario tool to assess how material and energy flows and corresponding GHG change over time given different choices and different developments paths for a EU renewable energy system.

3 Persons involved in the project

Supervisors Chalmers: Johan Rootzén (Energy Technology) and Simon Davidsson Kurland (Physical Recourse Theory)

Examiner: Mikel Odenberger

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Mistra Carbon Exit – www.mistracarbonexit.com

4 Background reading

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