**Master thesis proposal:**

**Using nutrients from sewage sludge in agriculture – improving life cycle assessments**

In order to avoid eutrophication, we treat our municipal wastewater to reduce its nutrient content. In agriculture, however, nutrients are valuable. By applying sufficiently clean and properly treated sewage sludge on arable land, the nutrients can be recovered, which reduces the need for mineral fertiliser, for which fixation of nitrogen from the air requires large amounts of energy and mineral phosphorus deposits are limited. However, to quantify the benefits of using nitrogen from sludge on land in environmental assessments is challenging!

The project “Improved life cycle assessment modelling of fertilisers – the case of sewage sludge” is a three-year academic research project that aims at improving the methodology and practice for assessing systems in which nutrients are recovered by sludge application on arable land. In close connection with the work within the project, a master thesis project is proposed. The thesis project will be performed at the division of Environmental Systems Analysis at Chalmers, Campus Johanneberg, during spring 2019, supervised by researchers in the research project, but will also include some contact with a reference group from the wastewater sector and fertiliser industry. The main aims of the thesis project are to look into, in connection to life cycle assessment:

- the plant availability of nutrients in sewage sludge
- which mineral fertiliser products that may be replaced by sewage sludge
- mass balances; the quantities and forms of nitrogen and phosphorus entering or leaving agricultural soil when sludge is land applied (can vary with weather conditions, soil type, practice when storing, transporting and applying the sludge, etcetera)

The suggested thesis project is to be conducted as one or two master theses, by one or two students (the scope of the study will be adjusted accordingly). The students should, preferably, have completed a course in life cycle assessment at master level (Chalmers courses VTM081, BOM250 or equivalent).

Does this seem interesting? If so, do not hesitate to contact us! Dr. Sara Heimersson, supervisor (currently on maternity leave, back in January 2019) and Prof. Magdalena Svanström, examiner and supervisor, magdalena.svanstrom@chalmers.se, 031-772 3001

- Are you interested in environmental systems analysis?
- Would you like to get insight in an academic research project and contribute to its research?