

Environmental Remediation with Negative Emissions (MSc only)

The globe faces many environmental challenges including climate change and long term industrial pollution. The legacy of fossil fuel consumption means that most emissions scenarios for the 21st century include negative emissions. The UN scenarios for net zero includes billions of tonnes of negative emissions in the form of BECCS (biomass energy with carbon capture & storage) and biochar, amongst others. The challenge to pure negative emissions from biomass range from land diversion through fugitive emissions, most of which can be mitigated by combining these concepts with phytoremediation.

Phytoremediation refers to growing plants on contaminated soils in order to concentrate the pollutants in the biomass. After harvest, the biomass can be treated to recover the pollutants and produce biochar. The biochar can then be used in a BECCS facility or added as a soil amendment to increase soil carbon. This project is based on remediation of lands polluted and heat exchangers to minimize waste disposal and fuel use. Expanding this concept to smaller buildings and neighborhoods can lead to significant GHG reductions by, for example, returning bio-methane to the natural gas network for space heating. By considering the overall material flows in the urban environment, the optimum path to net-zero can be identified.