IHE Delft is the largest international graduate water education facility in the world and is based in Delft, the Netherlands. The mission of IHE Delft is to work in partnership to strengthen capacity in the water sector, to achieve global sustainable development. IHE Delft has a permanent staff of 200 of which more than 100 are academics from all over the world, while about 250 guest lecturers from academia and industry contribute to our educational programmes. Each year 750 professionals (including about 200 new MSc students per year) attend courses at IHE Delft. The Institute has an international staff & student community with English as the working language.

The Water Supply Sanitation and Environmental Engineering Department aims to contribute to the global goal of providing safe drinking water and sanitation to all in an environmentally sustainable way. The department has three chair groups, of which the Pollution Prevention and Resource Recovery (PPRR) chair group focuses on recycling & reusing all resources (water, energy and waste streams). PPRR contributes to research and innovation for the application of environmental technologies in the framework of the water-energy-food nexus to support circular economies in developing countries and countries-in-transition.

The department intends to recruit a:

**Doctoral Candidate**

1.0 FTE / 38 hours per week

**Job Description**

PhD “Development of hydrothermal carbonization technology for production of added-value materials from agricultural waste in rural African areas”

Aligned with its research objectives, PPRR and more generally the WSSEE department is involved as a partner in a recently granted EU-Africa project, which aims at transferring to African rural areas simple, small-scale and robust biobased technologies (green biorefinery, pyrolysis, hydrothermal carbonization (HTC), briquetting, pelletizing, biocomposites and bioplastics production), adapted to local biomass waste, needs and contexts. The idea is to enable farmers to sustainably produce a variety of higher value biobased products and energy (animal feed, fertiliser, gas and water pollutant adsorbents, construction materials, packaging, solid fuel for cooking and catalysts for biogas production), therefore diversifying and increasing their income without compromising food security and ecosystem services. Four pilot cases have been selected for that purpose (Senegal, Ivory Coast, Uganda, Ghana).

IHE is in charge of the development and adaptation of the HTC technology from liquid/wet waste to produce biochar for use as fertiliser, gas/water pollutant adsorbent, solid fuel for cooking and catalyst for biogas production.

The PhD thesis will contribute to the set-up of this HTC technology via the experimental and numerical description of the performance of HTC reactors. Biochar yields and properties - relevant for the end-uses - versus operating conditions and feedstock will be assessed, aiming at improving the design and operation of the reactors.

For that purpose, a numerical model coupling both chemistry and fluid dynamics will be elaborated using OpenFOAM software. The model will be validated by means of experimental measurements carried out in the IHE lab-scale HTC reactor. In addition, the developments will be up-scaled in a real pilot plant assembled in the University Assane Seck of Ziguinchor (Senegal).
Requirements

- MSc in Chemical Engineering, Process Engineering, Environmental Engineering or related field
- Experience with numerical codes is strongly recommended (possibly CFD modelling)
- Experience with experimental work is strongly recommended
- Willingness to work in an international collaborative project is required (experience in African environment is an advantage)

Funding of the PhD

The funding will be ensured by the EU-Africa project mentioned above. The project is expected to start in June 2021 and last for 4 years, which corresponds to the duration of the PhD.

Terms of employment

This position is a temporary position with an initial contract of 18 months. Within the first year a go/no decision will be made on the progress of the candidate, which will determine whether or not the contract will be extended. The PhD candidate will graduate in co-operation with Delft University of Technology.

The position is based in Delft, The Netherlands. A competitive salary (scale P) is offered depending on qualifications and experience and in accordance with the Collective Labor Agreement for Dutch Universities (VSNU). Candidates should be prepared to carry out short-term missions abroad.

Information and application

Additional information can be obtained from Capucine Dupont c.dupont@un-ihe.org.

Applications (in English) should respond specifically to the requirements and should be sent before March, 22nd 2021 including curriculum vitae, a motivation letter, and the names and contact details of two contactable referees (as one PDF file with your family name as the filename), to IHE Delft, attn. Human Resource Management at recruitment@un-ihe.org, stating vacancy-number 21-WSSEE-01.