The treatment of domestic wastewaters and of the effluents produced in animal farms becomes a necessity in many countries for sanitary reasons. Large amount of wastes that are complex mixtures of urines, faeces and grey waters are to be treated. A new issue is to consider the potentiality of treating separately these fluids and to valorise some nutrients. Urine is mainly made of water (95%) that could be treated for certain purposes (agriculture); it also contains a high concentration of nutrients like nitrogen, phosphorous or potassium. Urine valorization by the recovery of these nutrients and their use as fertilizers for the local agriculture would allow closing the environmental loop between the nutrients that are necessary for plant growth and those rejected after their consumption by humans or animals. The objective of the PhD thesis is to study and to optimise a simple hybrid process for the separate treatment of urines. This process will be based on a combination of struvite precipitation and membrane filtration, with a specific attention given to energy consumption, that has to be minimised, on the basis of a lab scale experimentation performed with different kinds of urines. A modelling will be developed to take into account the possible environmental and sanitary impacts. On these basis, a rustic treatment line and a demonstration pilot plant will be designed.

Keywords:
sustainability, urine, valorisation of matter from waste, green fertilizer, chemical engineering, membrane processes, cristallisation, process ecodesign, rustic processes

Expected collaborations:
We are fully open to developp some collaborations on this topic with chinese groups that would be interested

Background required from the applicant:
Background in chemical engineering or in environmental engineering, ability to read and write in English, ability to work in a group, French speaking is not mandatory but would be appreciated

Existence of a PDF file detailing the proposal ("yes" or "no") : no
(see guidelines on the website www-csc.utt.fr)