

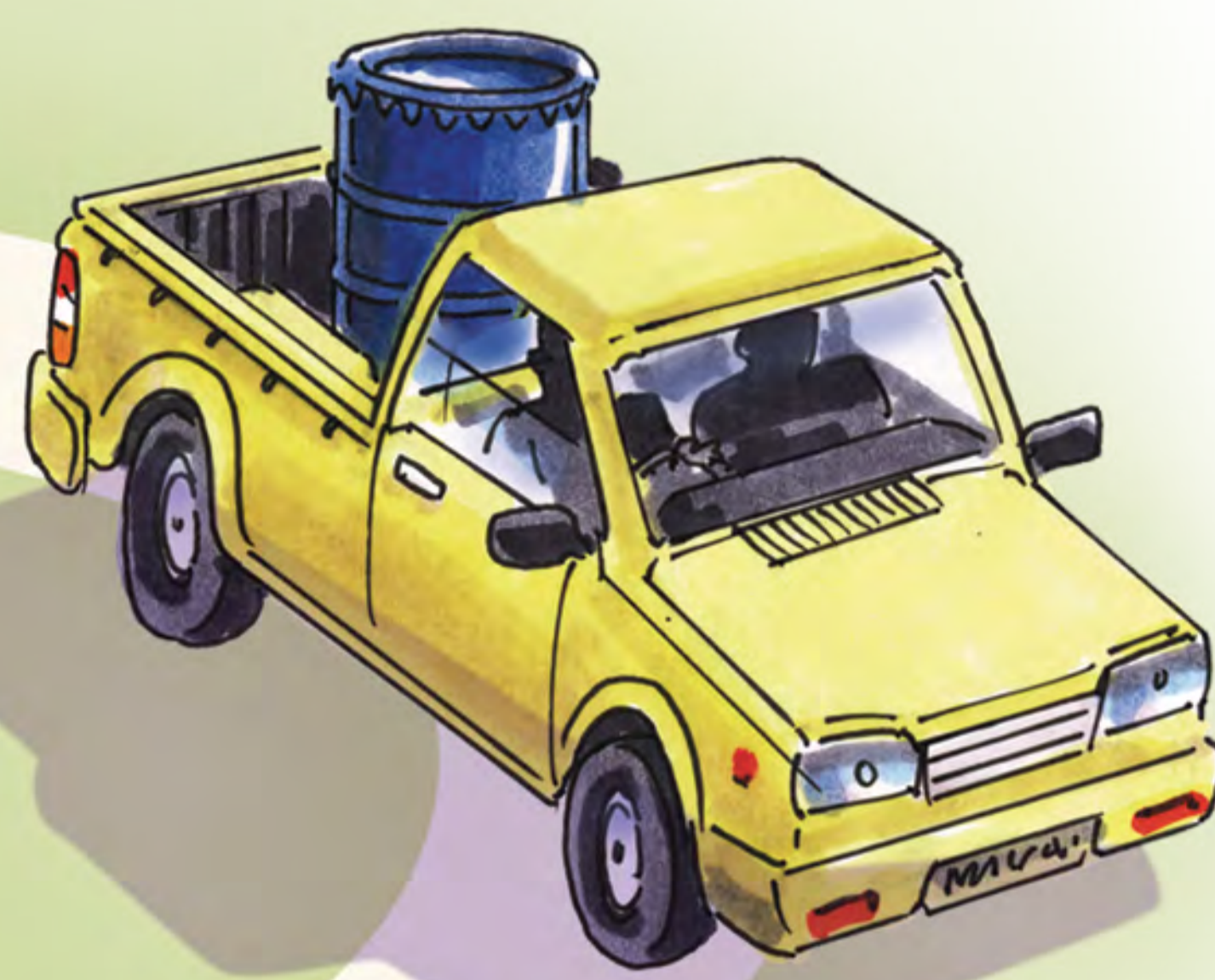
Urine contains **valuable** nutrients (nitrogen, phosphorus, potassium, sulfur).

By recovering these nutrients, we can turn a waste into a resource and promote **sanitation**.

Urine-diverting toilets **collect** urine separately. Do people **accept** urine diversion?

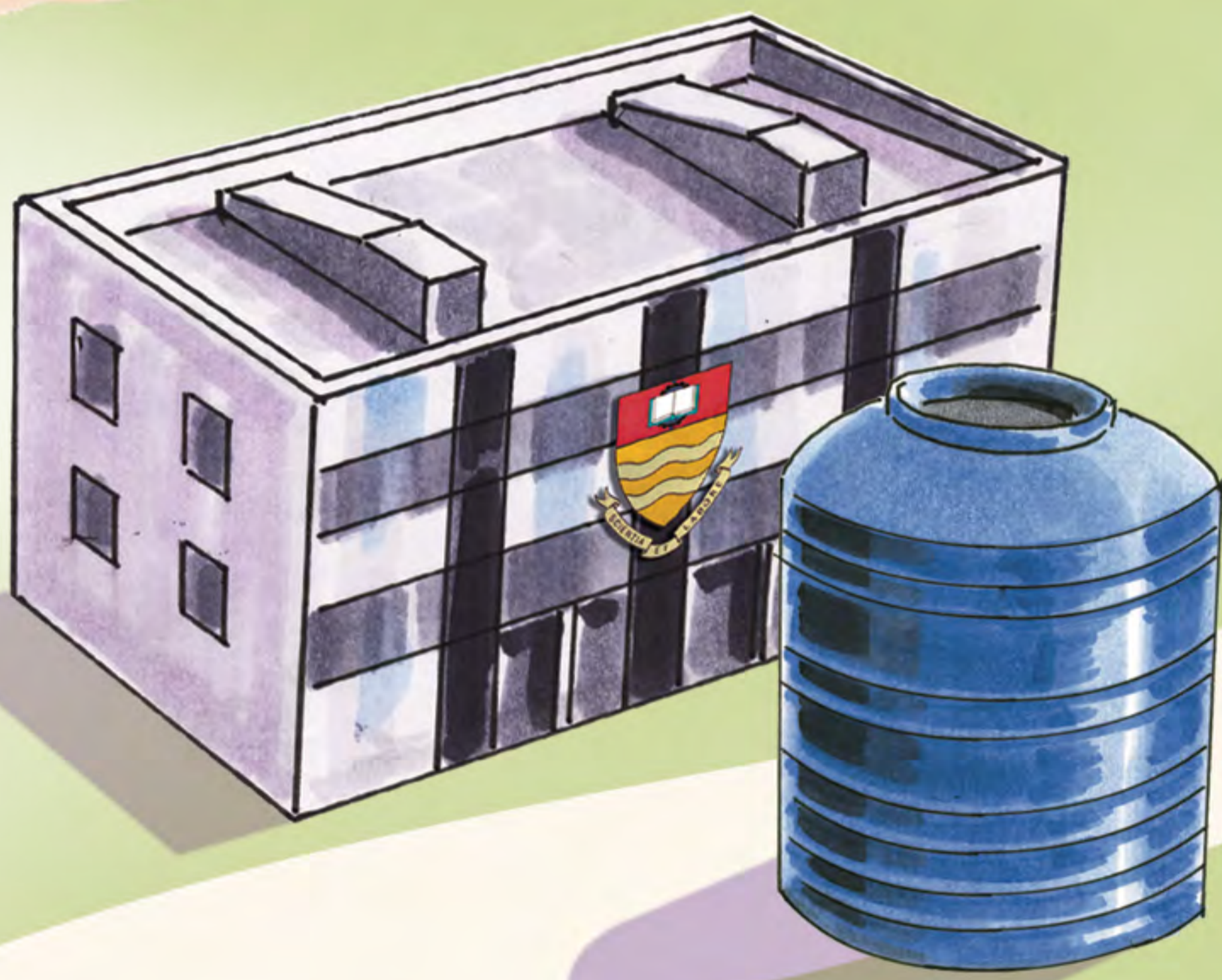
What volume of urine can be collected at what **expense**?

We address such questions in on-going field studies.



Urine is **transported** to a collection site, where technologies for nutrient recovery are tested.

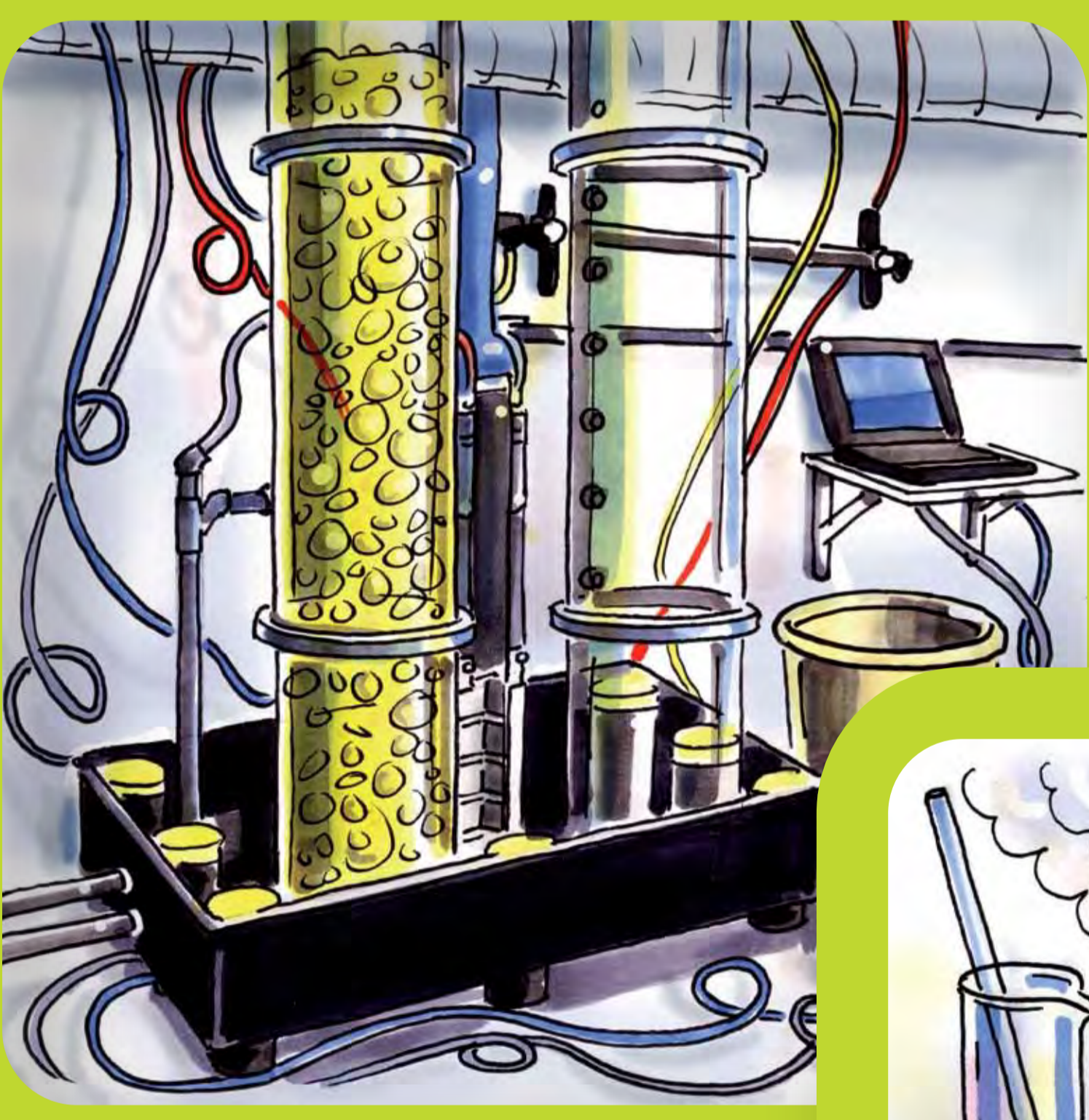
We develop **computer models** to minimize the costs for urine collection.



The VUNA project **unites** the expertise of the eThekweni Municipality, the University of KwaZulu-Natal (UKZN), the Swiss Federal Institute of Aquatic Science and Technology (Eawag), and the Swiss Federal Institute of Technology Zurich (ETHZ).



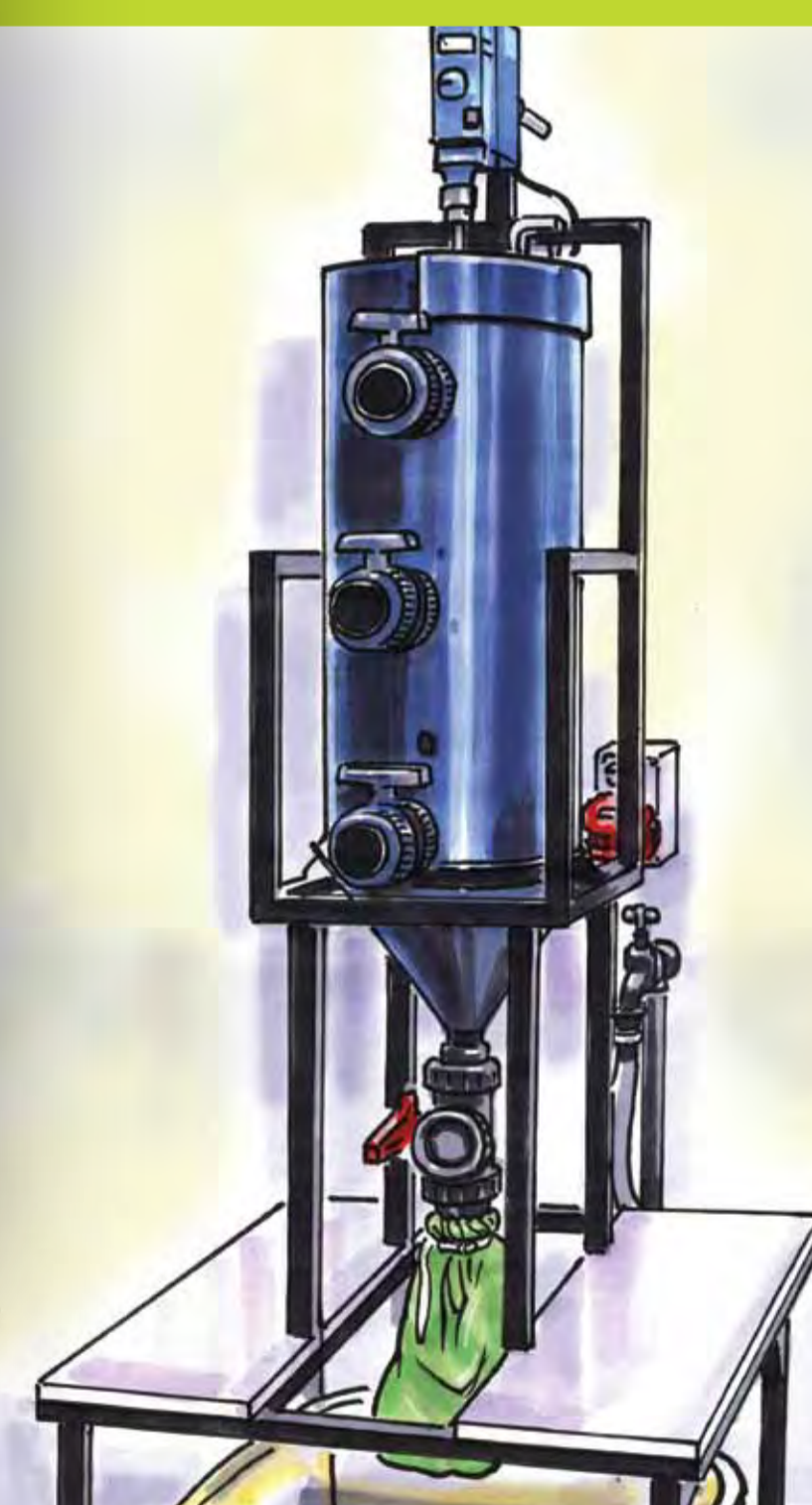
## urine treatment technologies



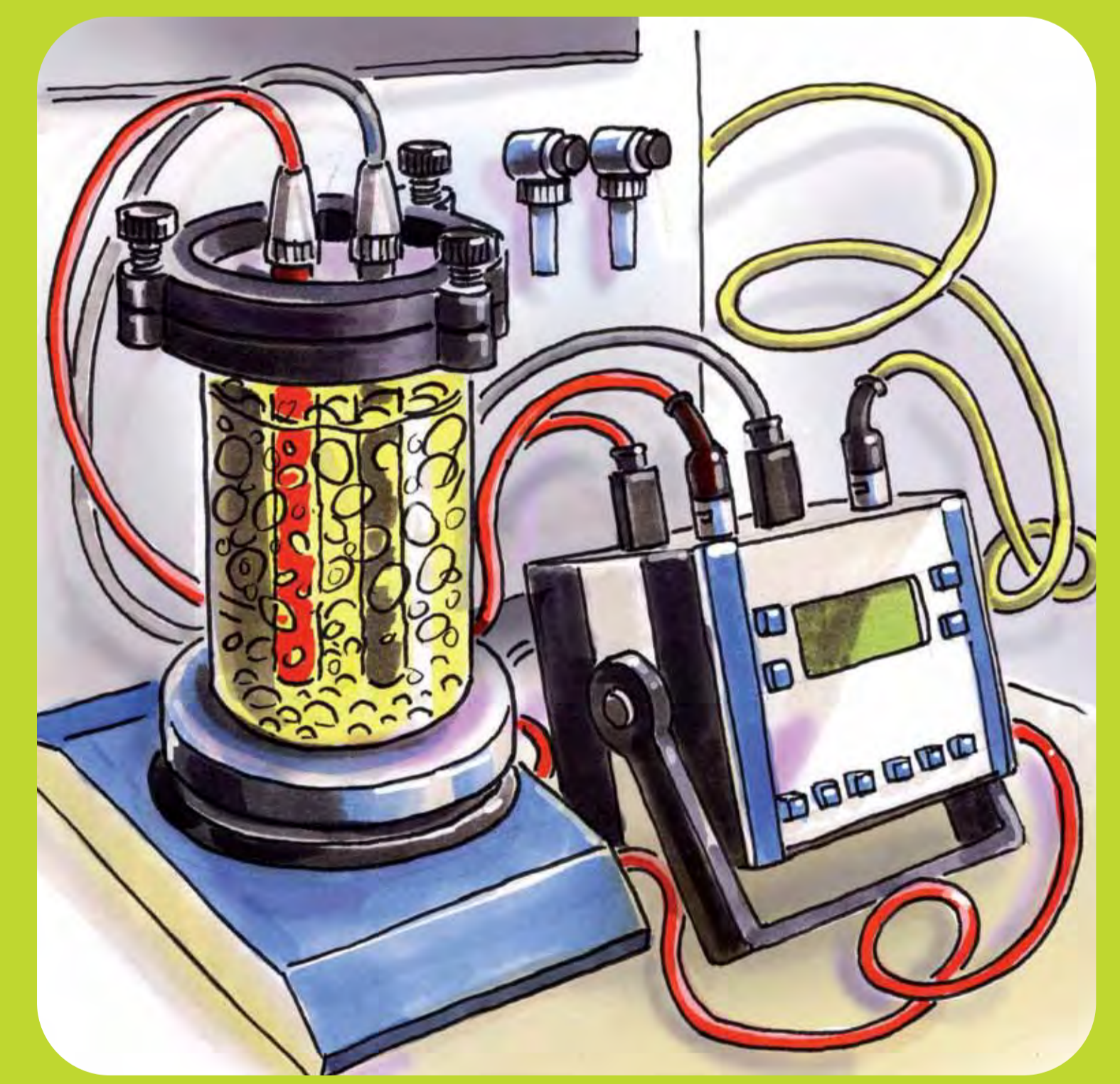
nitrification



distillation



precipitation



electrolysis

We test three **reactor set-ups**:

1. A combination of **nitrification & distillation** to recover all nutrients and produce distilled water.
2. Struvite ( $MgNH_4PO_4 \cdot 6H_2O$ ) **precipitation** to extract a phosphorus fertilizer.
3. **Electrolysis** to remove nitrogen, pathogens and hazardous organic substances.