Workshop 2: Recycled nutrient product qualities and standard

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1. **Q: Solubility vs. availability assays for P. Extended to plant availability?**
   A: Could be useful for a group of products, but is up to the industries
   Action: No action needed of the regulator. Industries & Research will self regulate.

2. **Q: Dealing with uncertainty ..... What about variability in product nutrient composition from recycled sources**
   A: part of the group: Farmers deal with variability (also with manure; NPK) but others say need to know how much (e.g. local /national authorities → limitations / application standards).
   Action: Determine quality and standard deviation. Improve inline measurements

3. **Q: How to deal with (non-limitative) list of emerging pollutants? Can bioassays play a role?**
   A: Organic pollutants never ending list; this is an identified issue
   Action: Incineration or amend a regulation to take this risk account.
Conclusions:
• New business model is necessary
• Social and legal acceptance of recovered products is necessary
• A huge range of technologies are in development and at demonstration scale, for different situations

Future actions:
• Future wastewater treatment must enable a better nutrient recycling (and also the old plants)
• Legislation must encourage and accept the recovery technologies

Workshop summary: ENRICH, RUN4Life, INCOVER, APPROVE
• Many technologies: vacuum toilets, P adsorption, Zeolites + membrane contactors, Hyper-thermophilic anaerobic digestion, constructed wetlands, evaporative systems...
• Recover not only P → PHA, N, bioplastics, bio-methane, organic acids, water...
• Technologies for centralized and decentralized treatment
• Integration the recovery of nutrients with innovative wastewater treatment systems
Workshop 3: LCA and LCC of P recovery processes

Output from discussions:

• FU unit
  – Depends on the goal and scope
  – Holistic vs. P-recovery approach (system vs. product)
  – Use both, was suggested

• Data collection
  – Plant specific vs generic
  – Pilot scale vs full-scale
  – Open source database for compilation of new and improved LCI data
  – Documentation and transparency

• System boundaries
  – Land application should be included (emissions to environment and savings, organic P comes with N)

• Data bases for background (indirect) data
  – Quality and relevance (old technologies) can be questioned
Workshop 4: technology transfer from municipal waste to/from manures and other waste streams

- **Research**: technology - upscaling/downscaling; Quality standards, investment, demonstration sites for techniques and products (contaminants are area of concern), simple and local solutions for rural areas
- **Investments**: marketing for new products/ convincing of farmers
- **Synergy**: between urban and rural areas in research
- **Communication**: knowledge exchange, consumer education starting at school, transparency, convenience vs “unknowns”
- **Policy**: driver for change
- **Funding**: for demonstration sites
Recommendations from workshop 5: how to move from R&D to implementation?

**Actions:**
- Control Business Plan / Technical requirements: check if shift is needed
- Market analysis: market penetration
- Risk analysis

**Planification:**
- Have a clear goal / clear and quantifiable KPI

**Organisations:**
- Feasible milestones
- IP: Protection of the technologies and exploitation of the results

**Partnership:**
- **final users**
- Strategic project partners: farming associations
- Investors