The Role for Waste Water in the Circular Bio-Economy

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Circular Economy

- A circular economy is an alternative to a traditional linear economy
  - Make, use, dispose
- In which we keep resources in use for as long as possible
- Extract the maximum value from them whilst in use
- Then recover and regenerate products and material at the end of each service life
The Water Cycle

- Water evaporates into the air
- Water vapour condenses into clouds
- Water falls as precipitation
- Water returns to the sea

https://www.bbc.com/bitesize/articles/z3wpp39

Key Stage 2 – What is the water cycle?
Circular World

Carbon Cycle
Nitrogen Cycle
Nutrient Cycle
Oxygen Cycle
Phosphorus Cycle
Sulfur Cycle
Rock Cycle
Potassium Cycle

https://en.wikipedia.org/wiki/Biogeochemical_cycle
https://wiki.ubc.ca/LFS:SoilWeb/Soil_Biology/Nutrient_Cycles/Potassium_(K)
Where do we go wrong?
Water Utility Pathways in a Circular Economy
The Water Pathway
The Energy Pathway

Biosolids to Energy

1. Organic energy
2. Heat
3. Topographic energy
4. Other renewable energy
5. Water
6. Recovered materials

1. Energy saving at treatment plants & distribution systems
2. Energy reduction and recovery at home
3. Electricity produced from distribution systems
4. Heat produced from distribution systems
5. Wastewater biosolids to energy production (gas, electricity & heat)
6. Renewable energy
Wastewater Resource Recovery

- Wastewater
- PHA for bioplastics
- Cellulose
- Biogas
- Energy
- PHA for bioplastics
- Alginate
- Struvite N & P
- Water Reuse
- Primary Treatment
- Biological Treatment
- Primary Sludge
- Secondary Sludge
- Anaerobic Digestion
- Reject Water
- Digestate
- Dewatering
- Caked Biosolids
- Thermal Processes / Incineration
- Ash
- Liquid Biosolids
- N, P, K, OM
Food for Thought

- The circular economy aims to decouple **economic growth** and **development** from the **consumption** of **finite resources**

- However, government regulation and financial incentives disincentivise achieving Sustainable Development Goals

- Financial incentives encourage profit over sustainability
Currently we pay lip service to the circular economy
Thank you

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