Beneficial reuse of sludge from water treatment processes
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General background

• In order to produce drinking water, the treatment processes also generate unavoidable by-products particularly residual sludge.
• Globally, millions of tons of solid waste is generated every year from water treatment processes
• In the Czech Republic in 2006, 34,000 tons of residual solid waste was produced by the water treatment plants
• In Italy the total yearly production of water treatment sludge of approximately 750,000 tons/year and the related disposal cost was estimated in about 50 million euro/year
• The UK water treatment industry annually generates approximately 182,000 dry tons of solid waste which costs £8.1 million (in the prices of 2012) for disposal
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• Regarding Australian practice, according to the estimation of the Victorian water industry, the associated cost to environmental-safe disposal of the sludge from the water treatment process is $130 per ton with the total of $6.2 million annual disposal cost
• SEQ Water annually generates approximately 70,000 tons of wet sludge which are mainly sent to landfill. This current sludge management practice cost $3.2 million in 2015 and this number will be expected to be double in 2020 due to the sludge from the upgrade of Crosby and North Pine WTPs
• Icon Water produces approximately 2200 tonnes of alum sludge annually from two water treatment plants
Barwon Water (Barwon Region Water Corporation) is Victoria’s largest regional urban water corporation.

In Barwon Water, the two main water treatment facilities namely Wurdee Boluc and Moorabool generate approximately 700 tons of sludge annually.
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General background

• Storing and then discharge of sludge to landfill currently is the most common option that has been in use for many years, although this option is not financially or environmentally beneficial.
• However, due to shortage of landfill sites together with the stronger reinforcement of the environmental regulations from the governments, disposing the water treatment to landfills becomes more costly and difficult.
The aims of the research project were to identify the beneficial sludge management by evaluating:

• Current water treatment sludge management practices in global and Australia
• Recent developments of water treatment sludge reuse techniques and management solutions
• Current drivers and barriers to water treatment sludge reuse alternative options
• Identify regional opportunities for sludge within an industry setting
• Evaluate the reuse options of water treatment sludge to identify the most practice approaches
This research will identify potential reuse options of the residual sludge from water treatment plants and analyse the economic and environmental aspects of these options.

The viable options will be analysed in order to identify beneficial approaches which can productively recycle the sludge and reduce the disposal cost related to water treatment sludge as well as the water treatment processes’ footprint to the environment.

How can sludge be turned from being a cost impediment for water utilities to become a source of revenue that is productive for the overall economy?
Beneficial reuse of sludge from water treatment processes

Literature review

- Improving sewage sludge digestion, odour and corrosion problems
- Perchlorate, fluoride, textile dye removal
- Brick making and other construction & road materials
- Substitute for clay in cement manufacturing process
- Geotechnical works & reclamation for quarries
- Soil conditioner and buffer for structural improvement
- Soil amendment & ameliorant for phosphorus immobility in agriculture
- Coagulant recovery and reuse in wastewater treatment processes
- Co-substrate for composting and bio-solids in land applications
- Silvicultural, agriculture such as potting media & animal feed
- Reuse in wastewater treatment as coagulant, adsorbent, co-conditioner and substrate in CWs
- Reuse in membrane water treatment processes

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Reuse and recycle options of water treatment sludge

- Coagulant recovery: acidification, alkalization, ion exchange and membrane separation

- Reuse in water treatment processes as coagulation conditioner and coagulant

- Reuse in wastewater treatment processes as coagulant, co-conditioner, substrate in CWs and odour & corrosion controlling materials

- Reuse as soil applications as soil ameliorant and co-application with biosolids

- Reuse as industrial applications in bricks, cement and other industries

- Reuse as pollutants removal: phosphorus, heavy metals and other pollutants absorbent
Thank you