

Energy costs estimation for 3 dewatering technologies in aggregate industry

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The aggregate industry

- crushing
- screening & washing
- dewatering



The aggregate industry



Residue slurry in aggregate industry

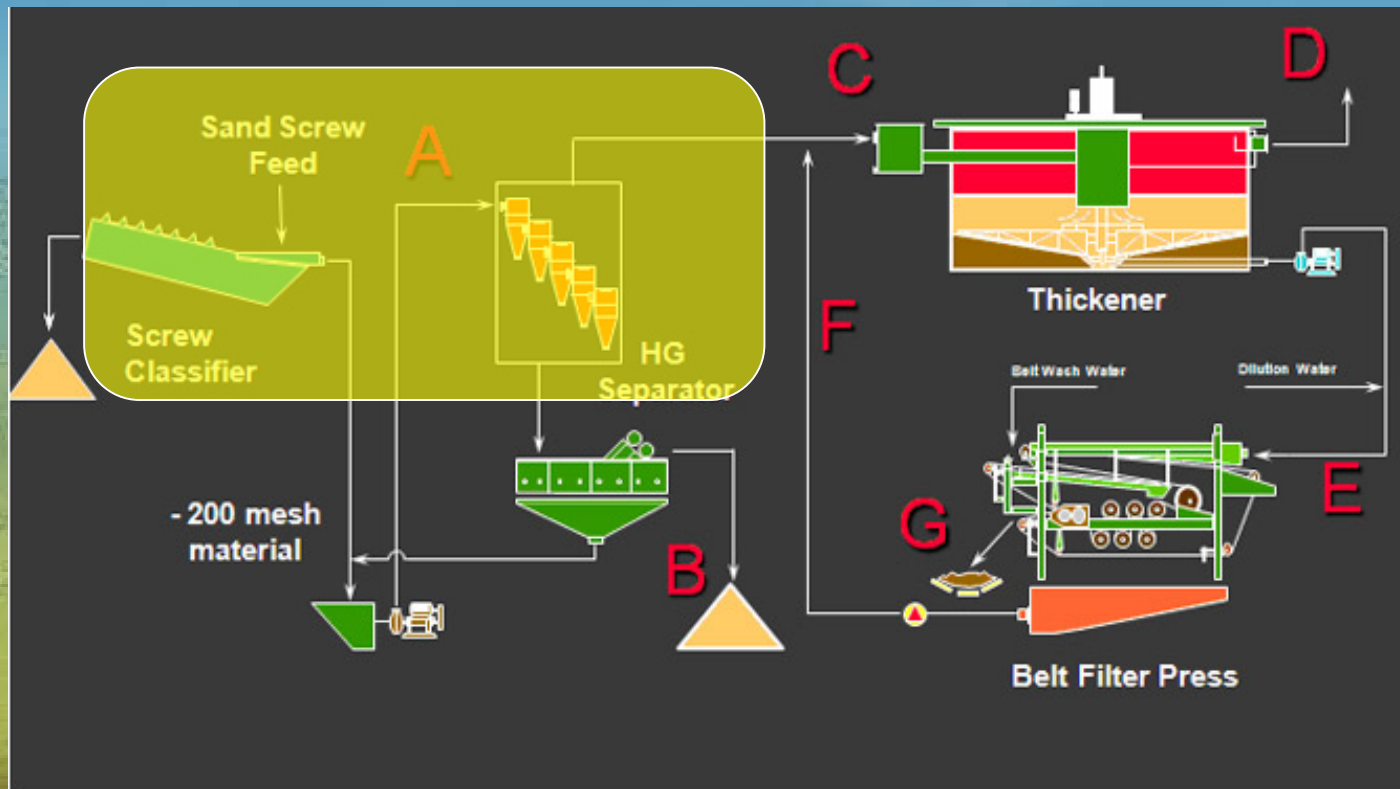
- Sand specifications
- minus 200 mesh to
- 400 mesh range

watering



Residue slurry treatment

- screw classifier and
- hydrocyclones overflows



Residue slurry treatment

- dewatering screens



Settling ponds

- slow sedimentation



Settling basins

- low efficiency

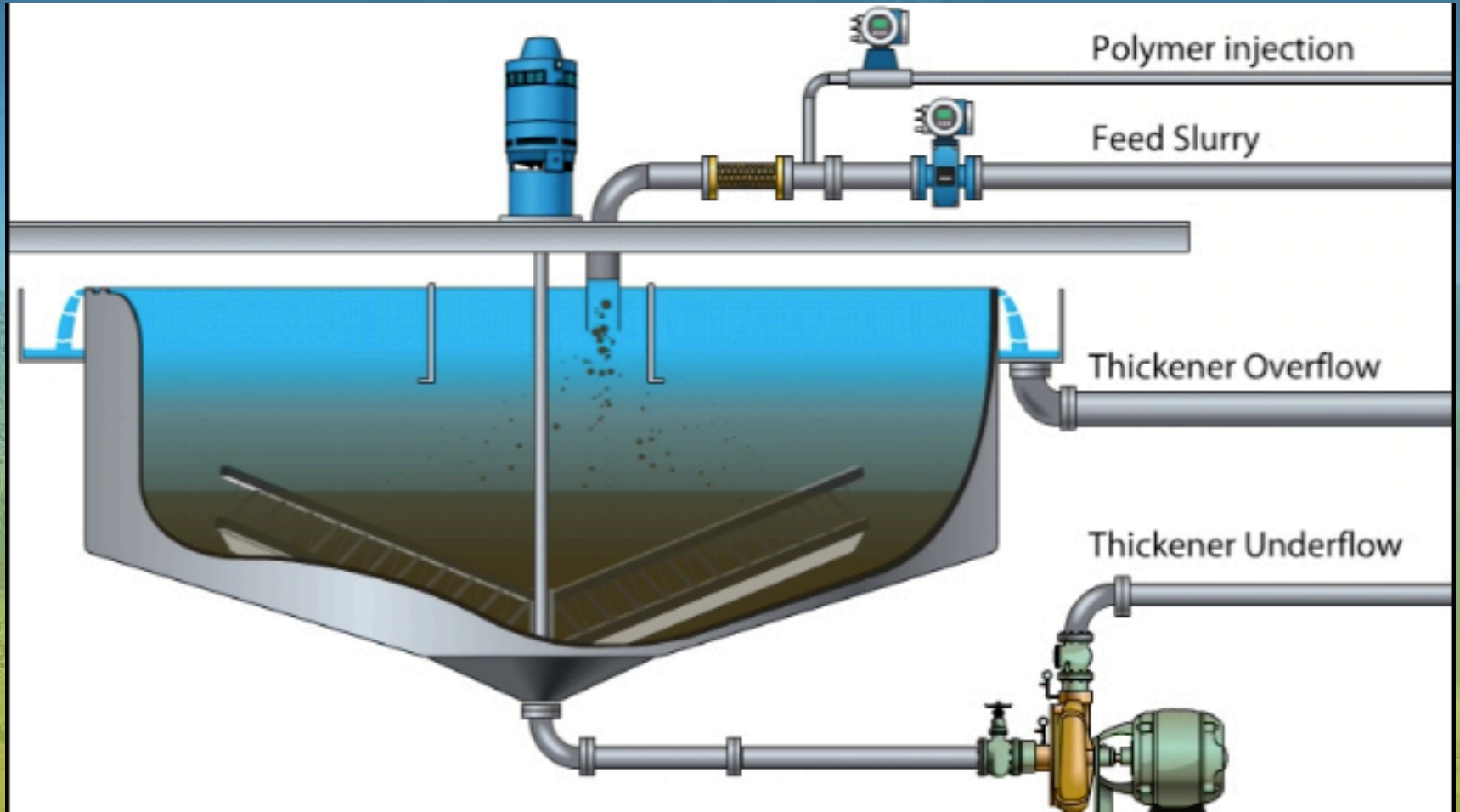


Gravity thickener with raking system



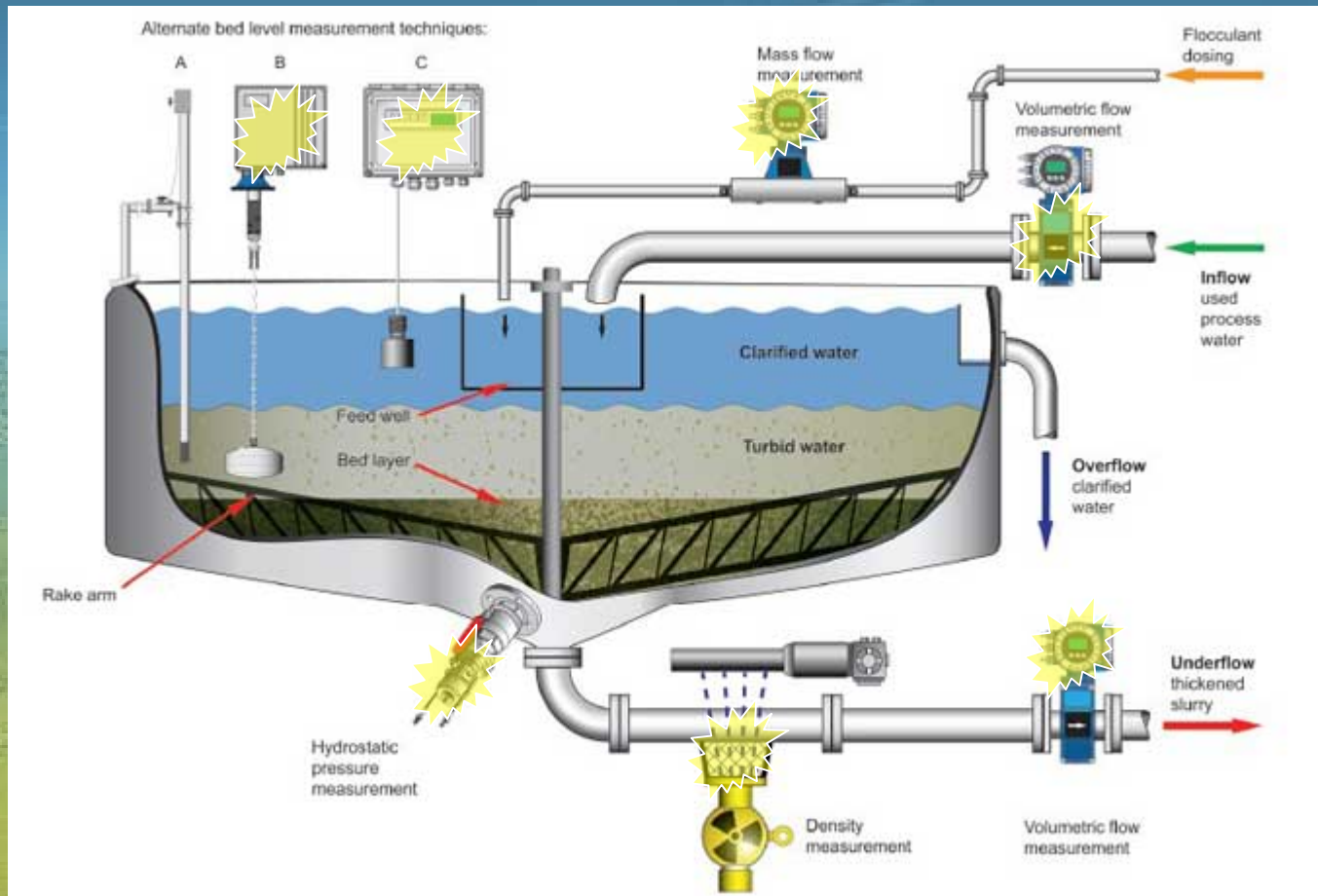
Thickeners

- fluid flowing parts



Thickeners fluid control parts

- controlling the fluid flowing parts



Thickener raking arms

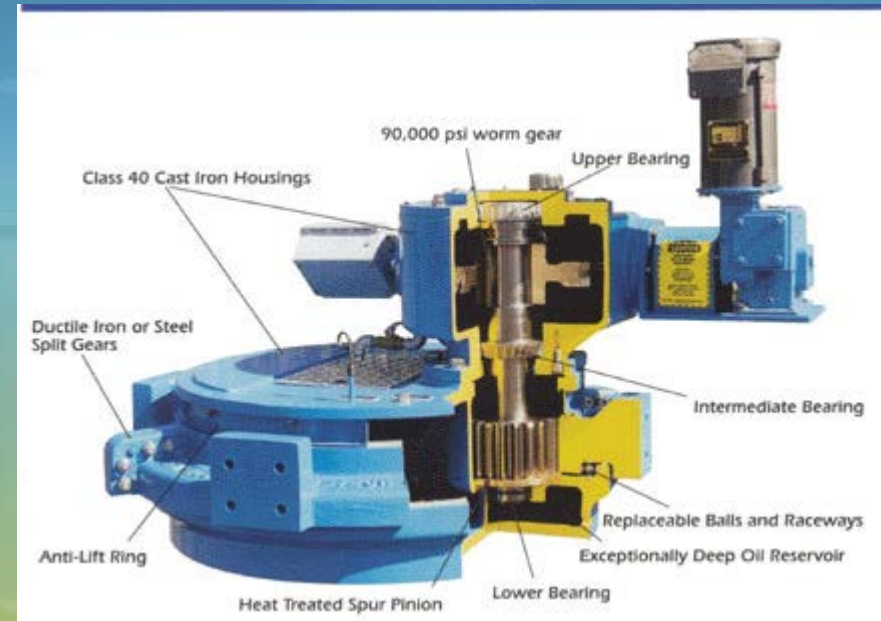
- to convey the settled solids from the entire area to the discharge cone

Energy requirements!



Thickener drive unit

- up to 4 electric motors required

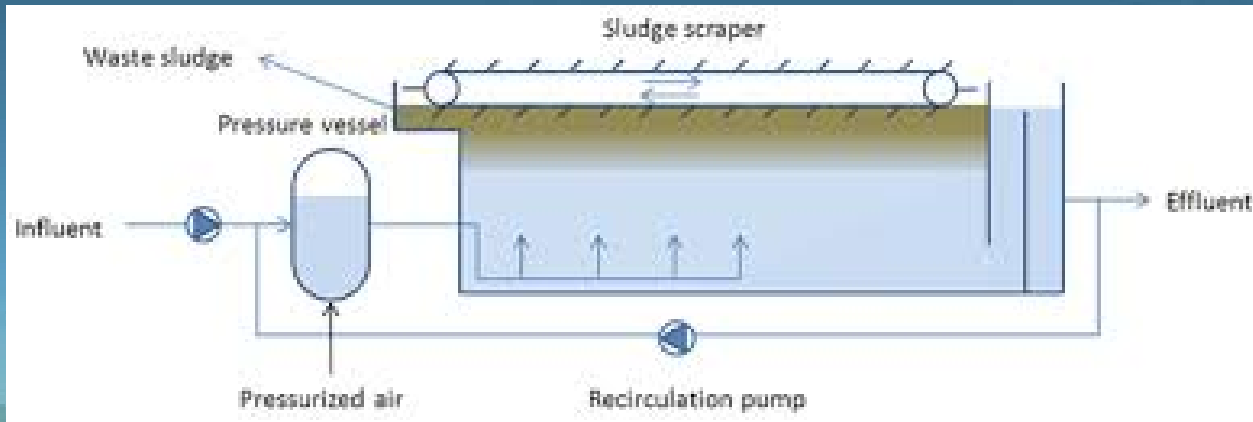


The energy costs estimated for a thickener to be used in Alvand plant

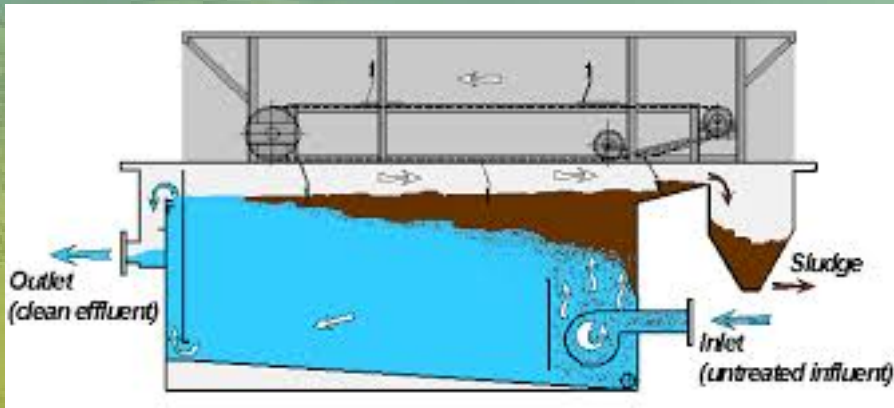
- The pumping costs **£0.0860**
- The driver motor costs **£2.4457**



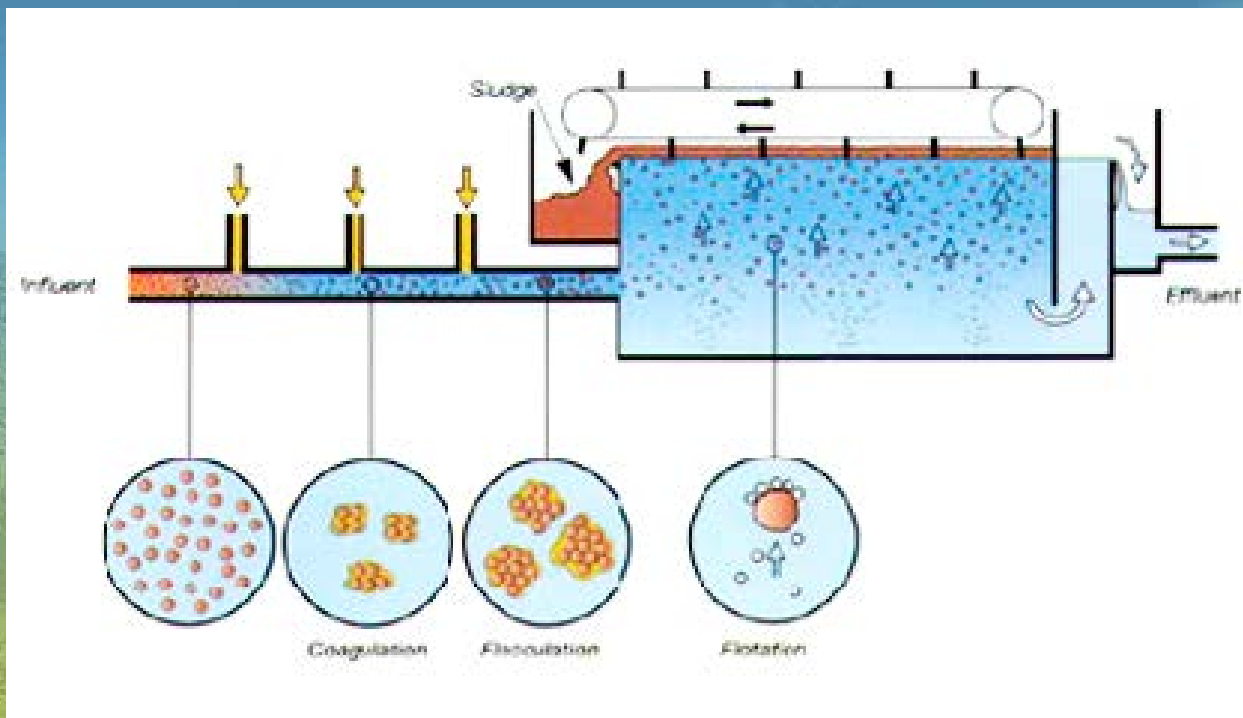
The DAF thickening systems



Energy requirements!



Flocculation & Flotation



How water is pressurized with air

- DAF air pump
- Air + water = white-water

- DAF compressed air & pump



More on energy requirements!



The DAF skimmers



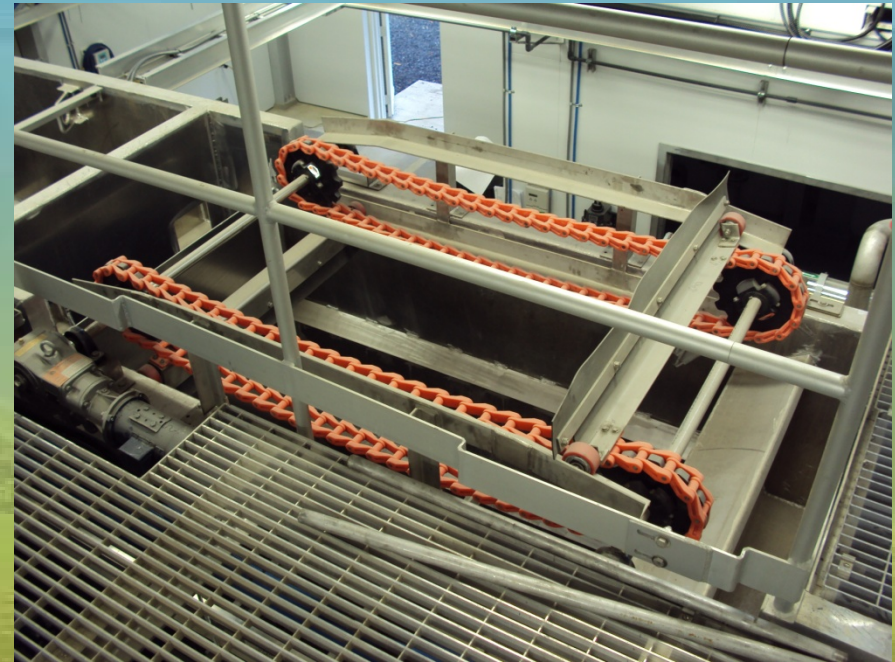
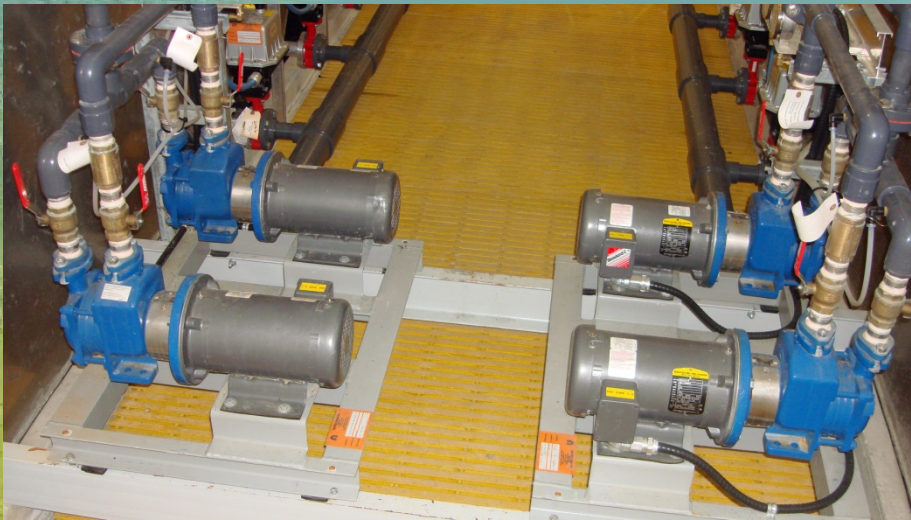
The DAF drive motors

- to support the skimmers



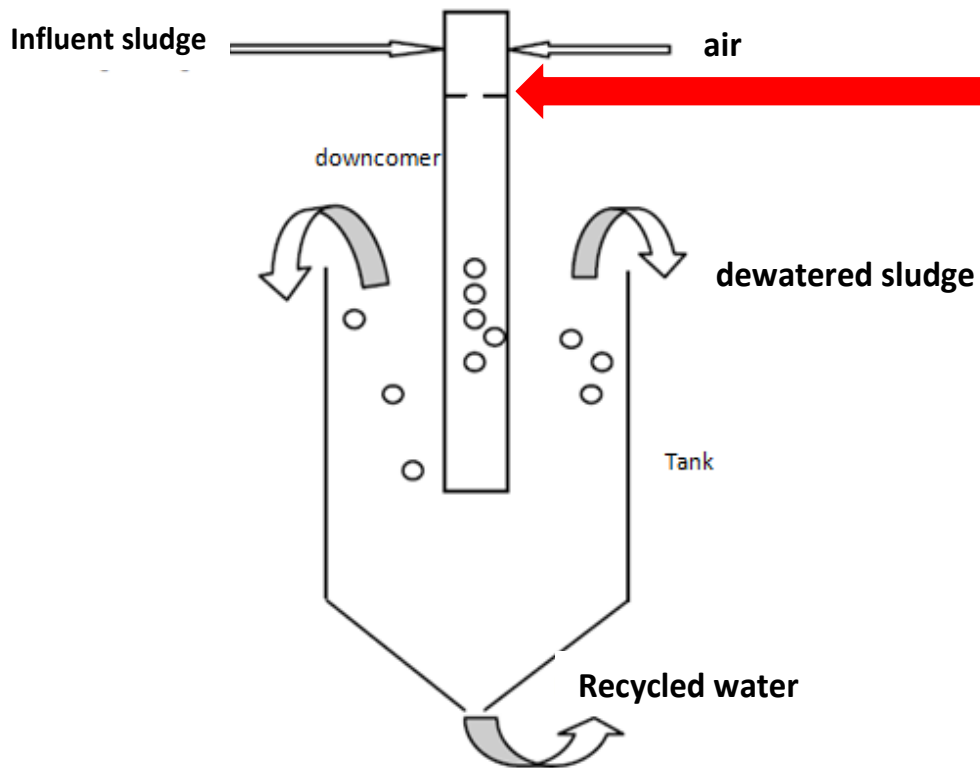
The energy costs estimated for a DAF system in Alvand agg. plant

- The pumping costs **£0.1205**
- The driver motor costs **£0.774+£1.2455**
- The air compressing costs **£0.0132**



The Jameson cell

Pumping energy is the main part

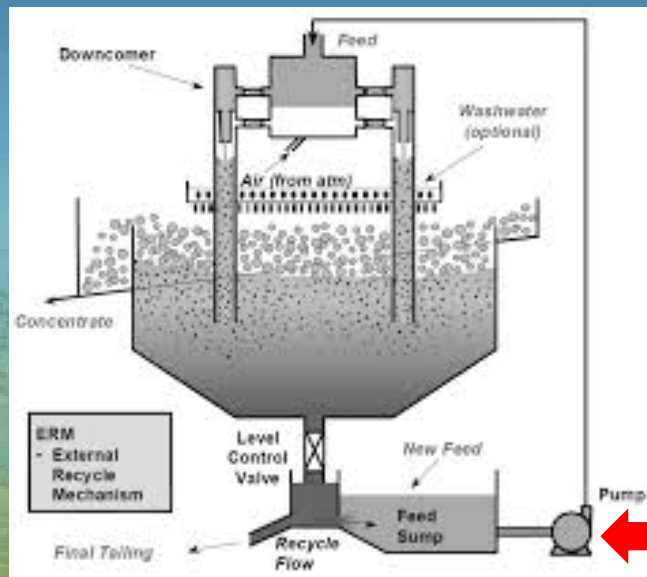


The lab. Scale Jameson cell



The energy costs estimated for a Jameson cell in Alvand agg. plant

- The pumping costs **£0.2151**

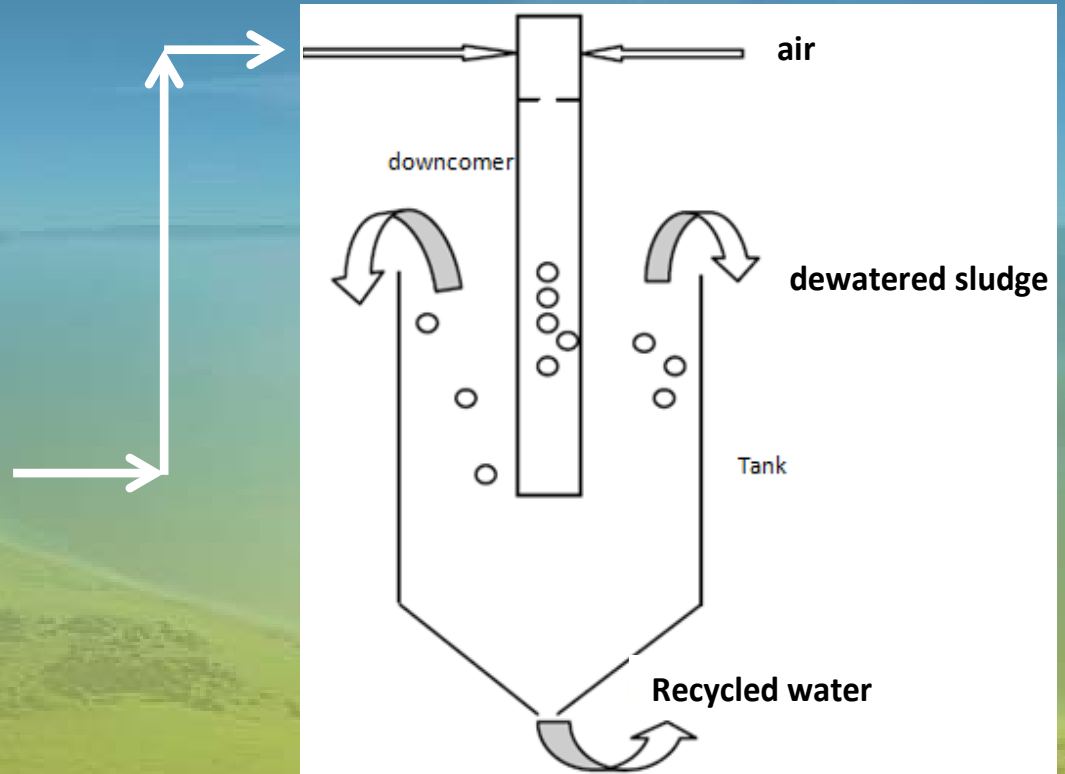


Energy costs comparison for dewatering (75 m³/h, 330 gpm)

System	Pumping Cost	Air Compressing Cost	Driver Motor Cost	Total Cost £/hr
DAF	£0.1205	£0.0132	£0.774+£1.2455	£2.1532
Thickeners	£0.0860	-----	£2.4457	£2.5317
Jameson cell	£0.2151	-----	-----	£0.2151

Energy saving proposal

- shorter stay in the ponds, and
- reporting very fine ($\sim 10\mu m$) to the Jameson cell



An aerial photograph of a vast, flat, green landscape, possibly a coastal plain or a large field, under a clear blue sky. The terrain is mostly uniform in color, with some subtle variations in green and yellow, suggesting different vegetation or soil types. The sky is a deep, clear blue with a few wispy clouds near the horizon. The overall scene is bright and open.

THANK YOU