

A brief Introduction to Forest Industry Side Streams



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GREEN LIQUOR DREGS

Green liquor dregs (GLD) are known to be the largest fraction of the inorganic residue in the kraft pulping process in the Forest Industry.

- Utilized in soil construction works and minor amounts as desulphuration agent in the power boiler
- But is still one of the main waste streams taken to landfill sites from chemical pulp mills.
- Originates from a chemical recovery cycle where effective cooking chemicals are regenerated back to the process and suspended wood ash components are removed as dregs.
- In Finland UPM produces 60 000 wet tons of GLD annually, and globally more than 100 000 tons.

GREEN LIQUOR DREGS

A Clay-like wet grey/black state

- The composition varies depending on its dewatering at the mill.
- The GLD treatment process, using a pre-coat lime mud filter (the pre-coat is a mixture of CaCO_3 , Ca_2O and $\text{Ca}_3(\text{OH})_2$), leads to various amounts of lime mud mixed with the green liquor, which strongly influences the final composition of the dregs.
- Typical properties with pre-coat lime:
 - pH value 11–13
 - Dry matter content (105 °C) 45–55 w-%
 - Loss on ignition (550 °C) 5–10 w-% DS
 - Ash content (950 °C) 60–66 w-% DS

Main components (w-% DS)

- Mg 2–6
- Ca 30–40
- S 0.5–2.5
- Na 1–2

WOOD BASED FLY ASH

- Energy generation from the wood-based residues at forest industry generates a large amount of dry biomass fly ash from power boilers.
- In Finland UPM produces 57 000 tons of biobased fly ash annually in own and co-owned power plants. Globally more than 200 000 tons.
- Mainly used in soil construction works, but also in the cement or building block industry or as a fertilizer: at field as a neutralization agent and especially as a granulated forest fertilizer.

WOOD BASED FLY ASH

- Odorless dry brown/grey powder
- Differs from coal fly ash in its composition and shape
- Main element is Ca and it's present as e.g., CaO, CaCO₃, CaSO₄ and therefore the pH is typically high: 11-12
- The siliceous components are mainly derived from fluidized bed sand.
- Specially Ca content varies between different power boilers and depends on the biobased fuels used.
- Fluidized bed combustion results in irregularly shaped fly ash particles.

Main components (w-% DS)

- Ca 15–40
- Si 3–12
- Al 2–8
- Fe 2–6
- Mg 1–3
- K+P 2–5



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