A brief Introduction to Forest Industry Side Streams
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 $\text{CaCO}_3$, $\text{Ca}_2\text{O}$ 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