

# Innovative new raw material handling in the manufacture of wood pellets leads to controllable self-heating during storage

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# Background

- Self heating and emission of CO and CH<sub>4</sub> is common at storage of freshly produced wood pellets, especially when pine (*Pinus sylvestris*) sawdust is used as raw material
- Pine sawdust is often stored for > 3 months to achieve sawdust maturation. This improves the quality of the pellets and reduces the risk of self heating and off-gassing at storage of the pellets
- Storage of sawdust in big piles for a long time is expensive...



# Our idea

- Separate handling of pine sawdust from small diameter logs and large diameter logs
- Hypothesis 1: Different proportions of sapwood and heartwood in small diameter and large diameter logs → different self-heating and off-gassing behavior and quality of pellets
- Hypothesis 2: Different drying techniques in combination with different sawdust fractions will give pellets with different quality
- Let's try this in full industrial scale



# Solør Bioenergi Älvdalen pellet factory



Stored pine sawdust

# Raw materials for the tests

BLYberg - pine in thin dimensions



MORa - pine in thick dimensions



REFerence – 3 parts stored, 2 parts fresh, 1 part "dump" pine sawdust

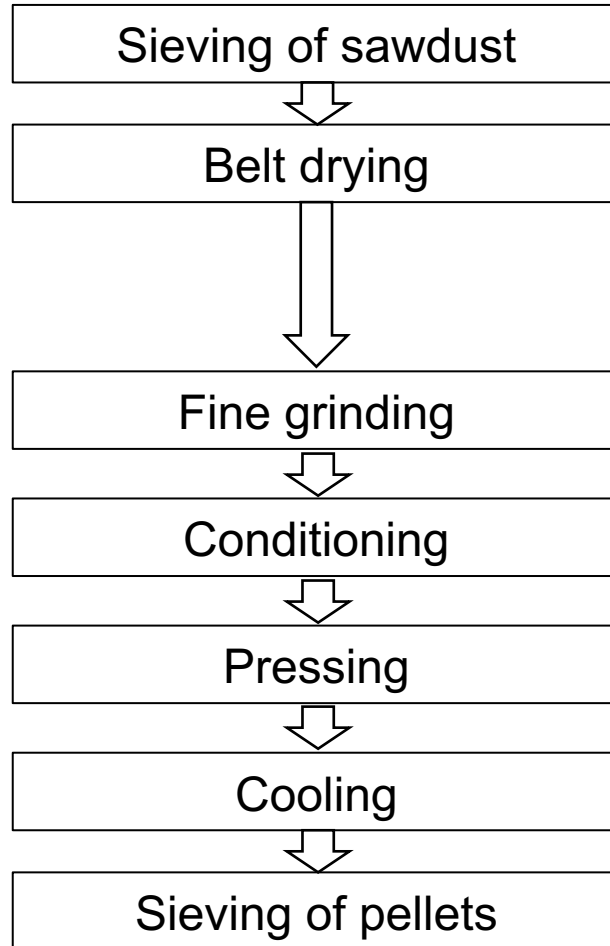


# Delivery of sawdust from Blyberg & Mora saw mills to Älvdalen pellet factory, totally 30 trucks

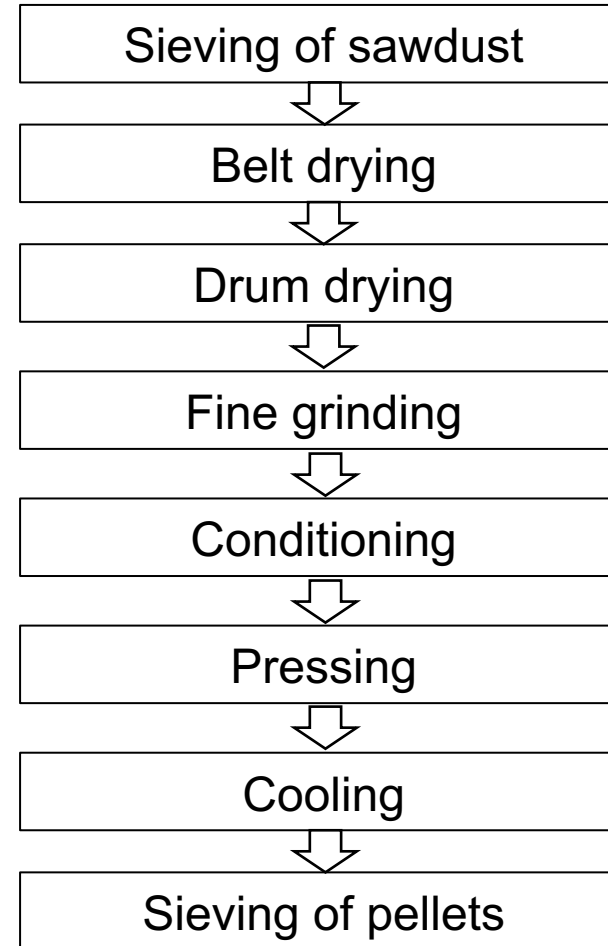


# The process at Solør Bioenergi Älvdalen

## First week



## Second week



# Experimental design

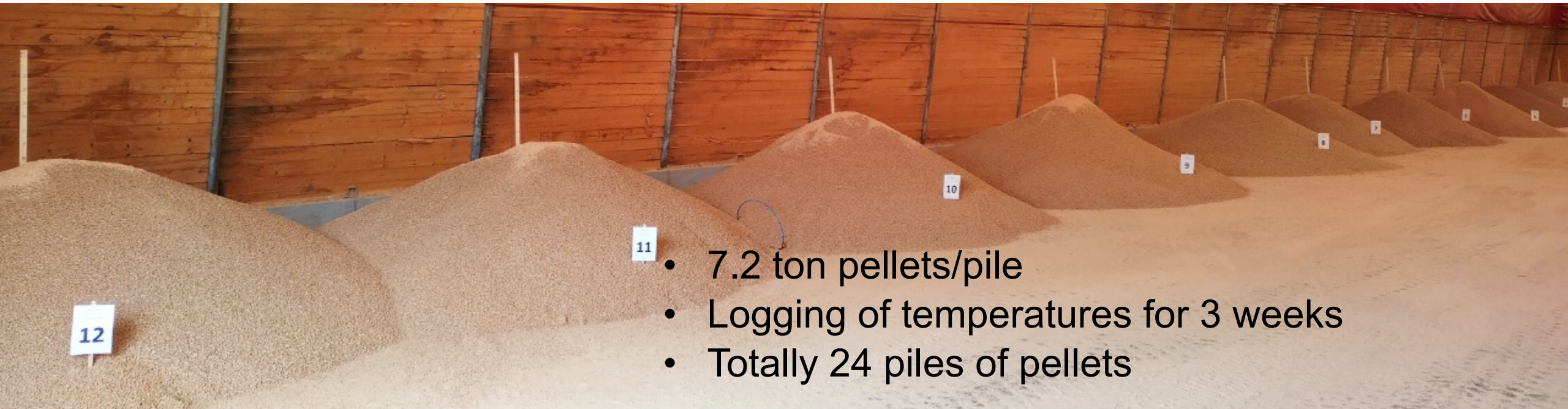
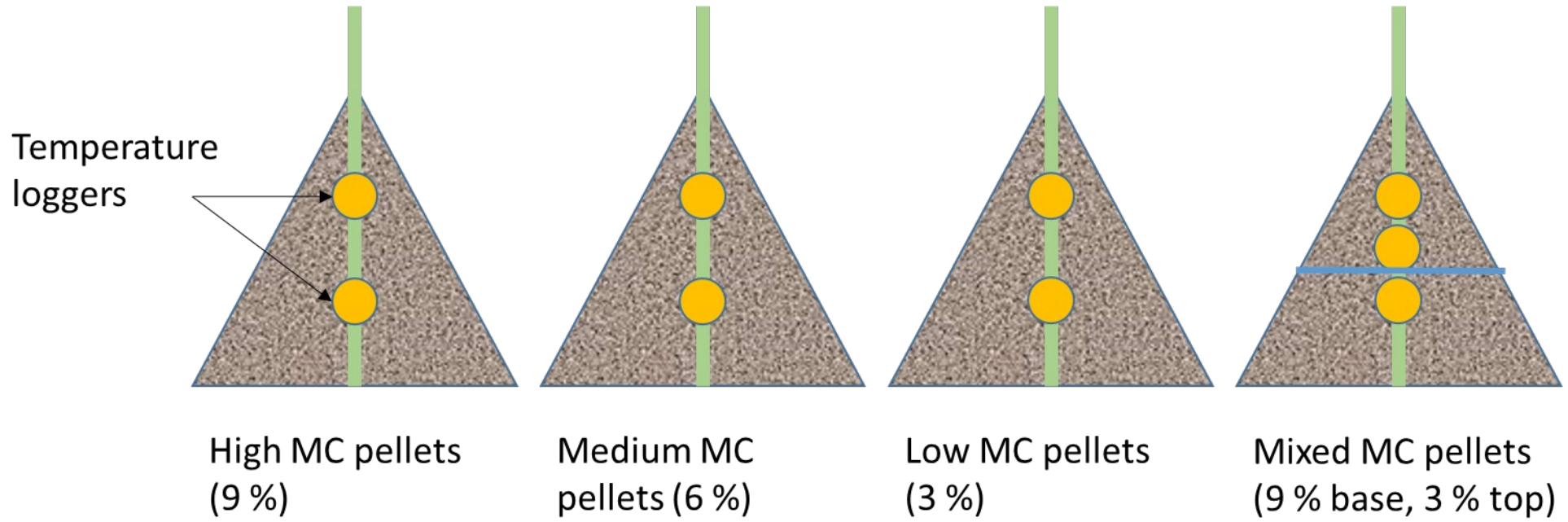
- 3 different raw materials (REF, BLY, MOR)
- 3 pellet moisture contents (high 9 %, middle 6 %, low 3 %)
- 2 drying processes (A: belt dryer, B: belt dryer+drum dryer)
- Pellet properties directly after production and after 3 w storage
- Temperature logging during storage in piles
- Off-gassing measurements: CO, CO<sub>2</sub>, CH<sub>4</sub>, O<sub>2</sub> directly in piles



# Process settings

- Dye length 90 mm,  $\varnothing$  8 mm
- Production rate 3.5 ton/h for each press
- Week 1, only belt dryer, 1-2 presses were used
- Week 2, belt + drum dryer, all 3 presses were used



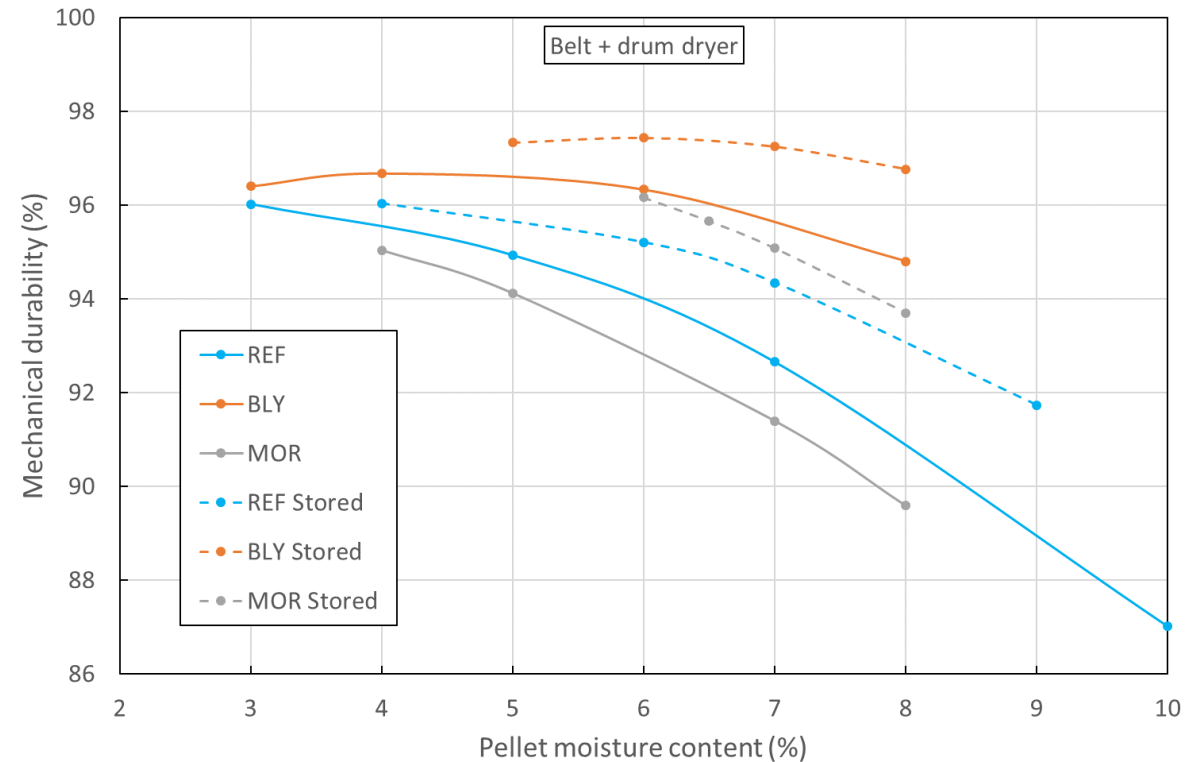
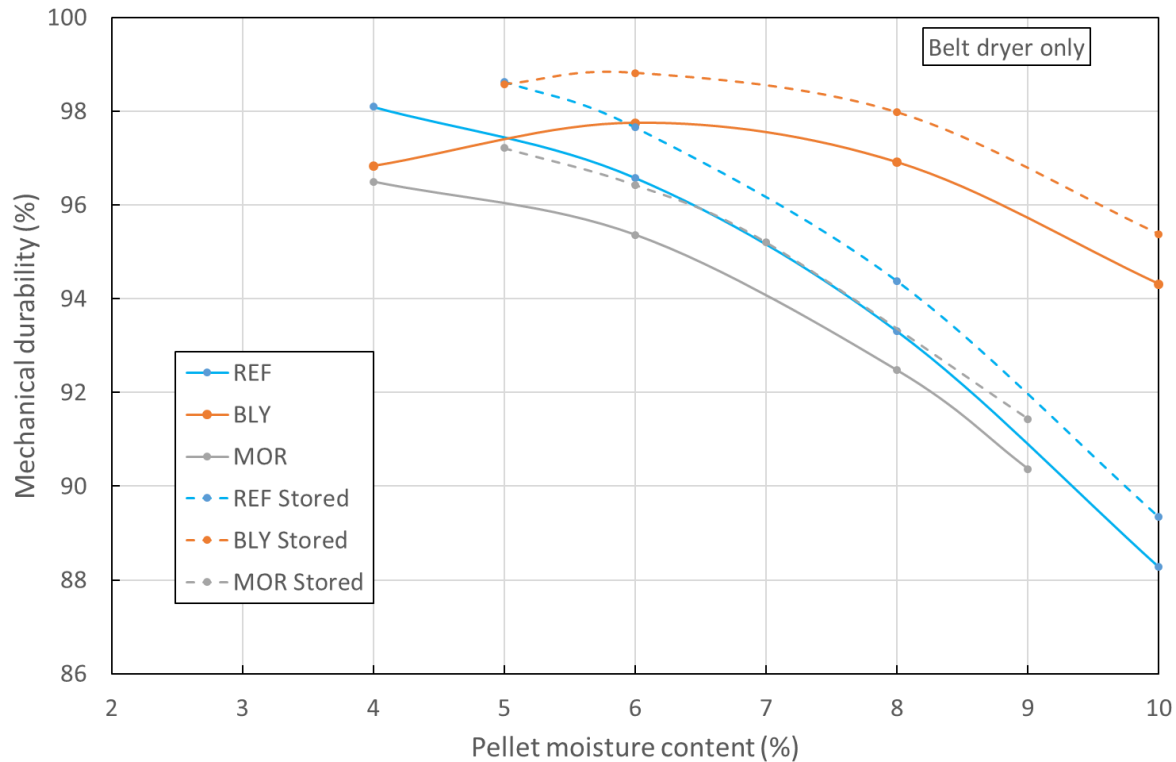


# Off-gassing in pellet piles

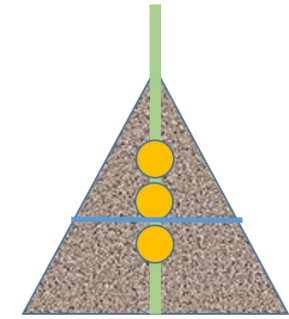
- Equipment for measuring emissions of CO, CO<sub>2</sub> and CH<sub>4</sub> in pellet piles



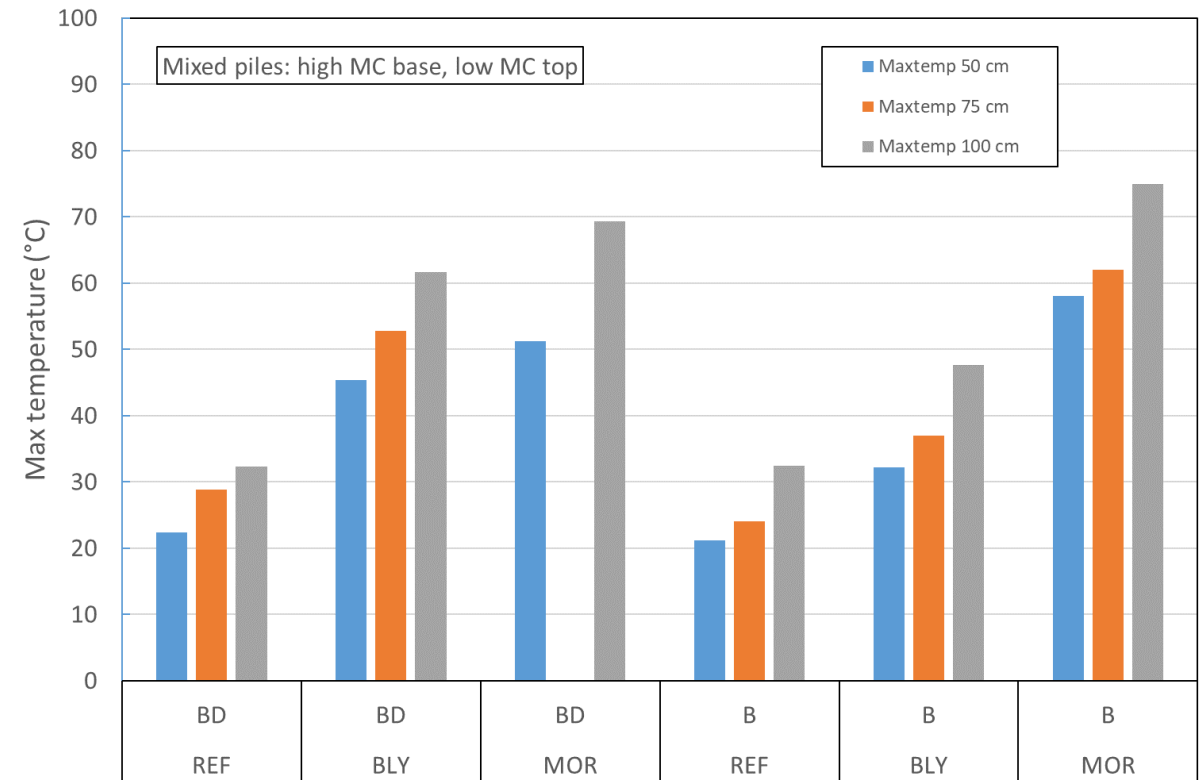
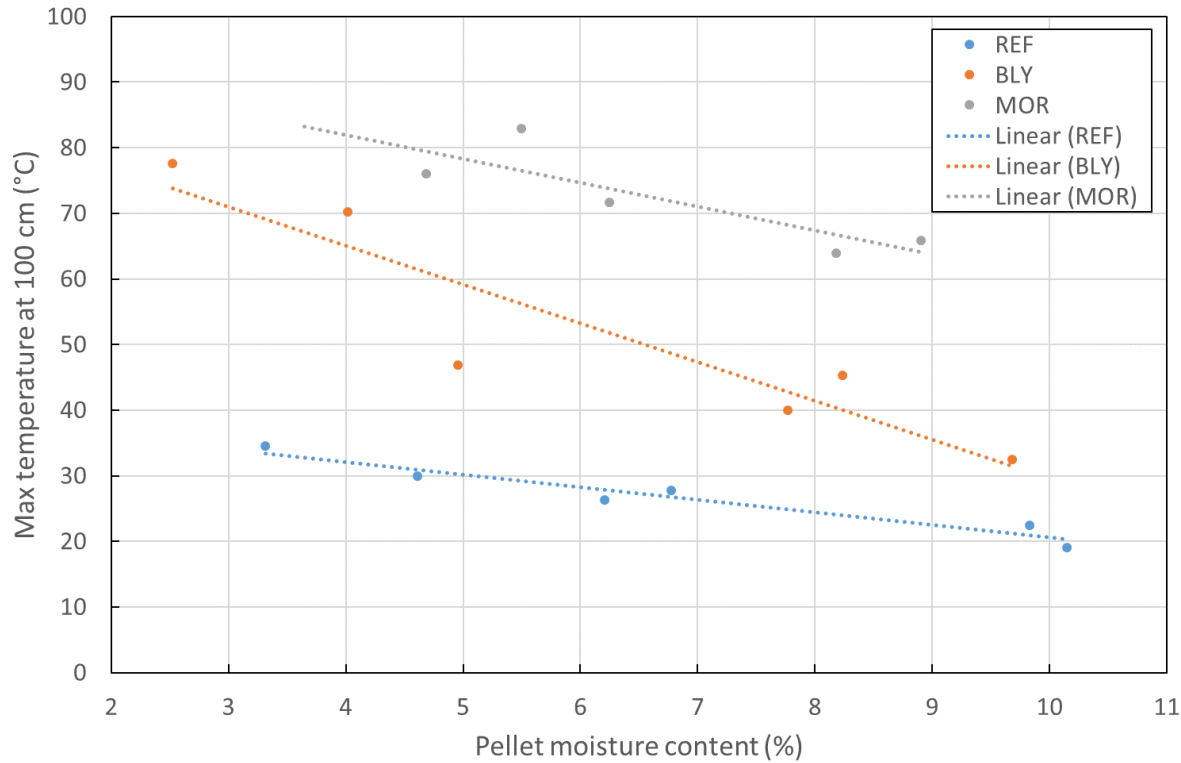
# Results: Mechanical durability of pellets



# Results: Temperature in the pellet piles

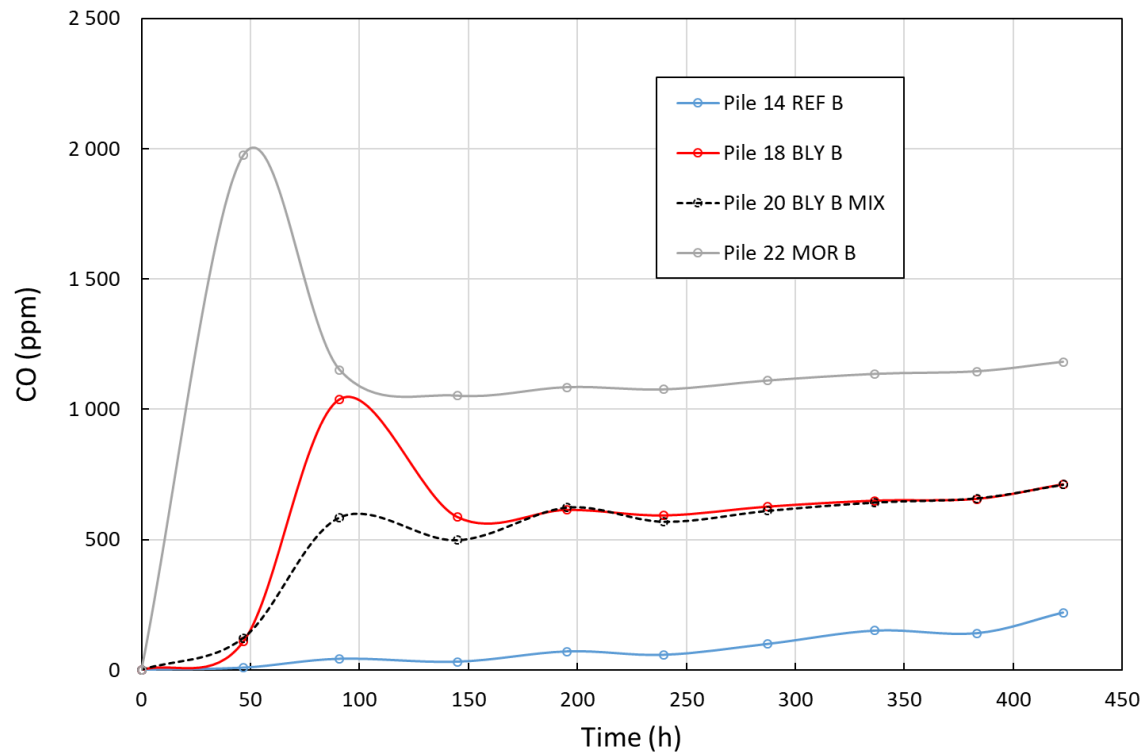


Mixed MC pellets  
(9 % base, 3 % top)

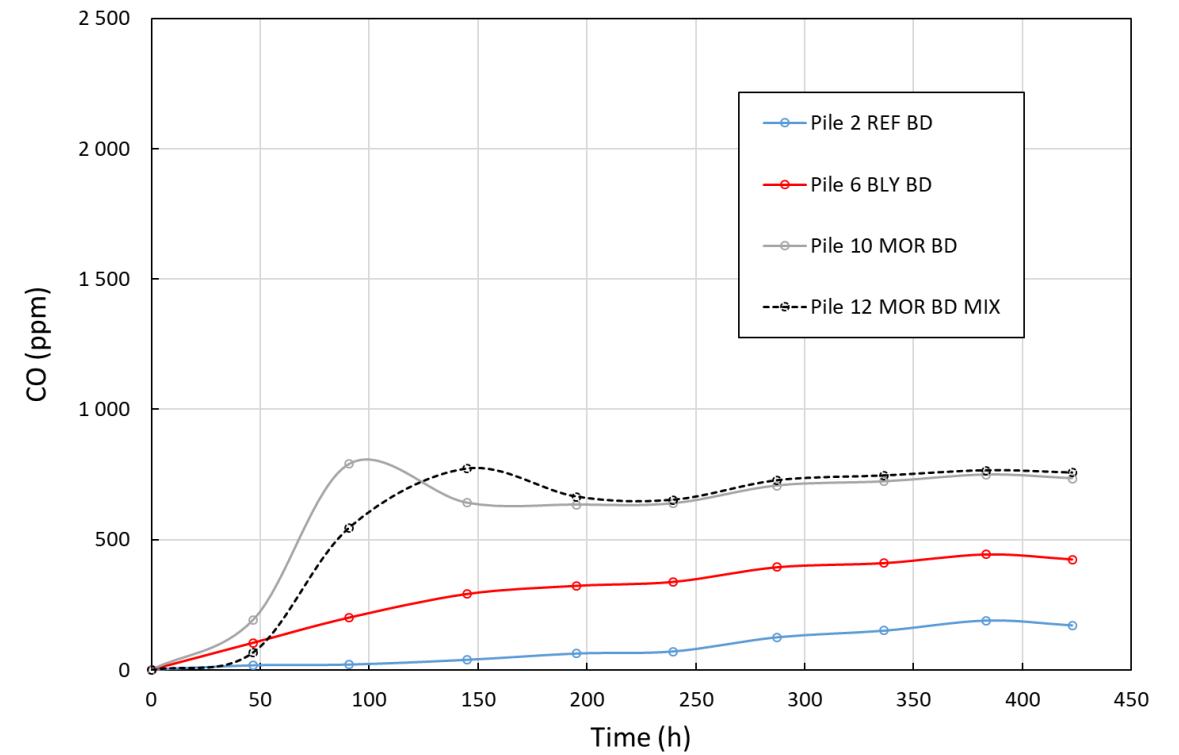


# Results: CO emissions in pellet piles

## Belt dryer only

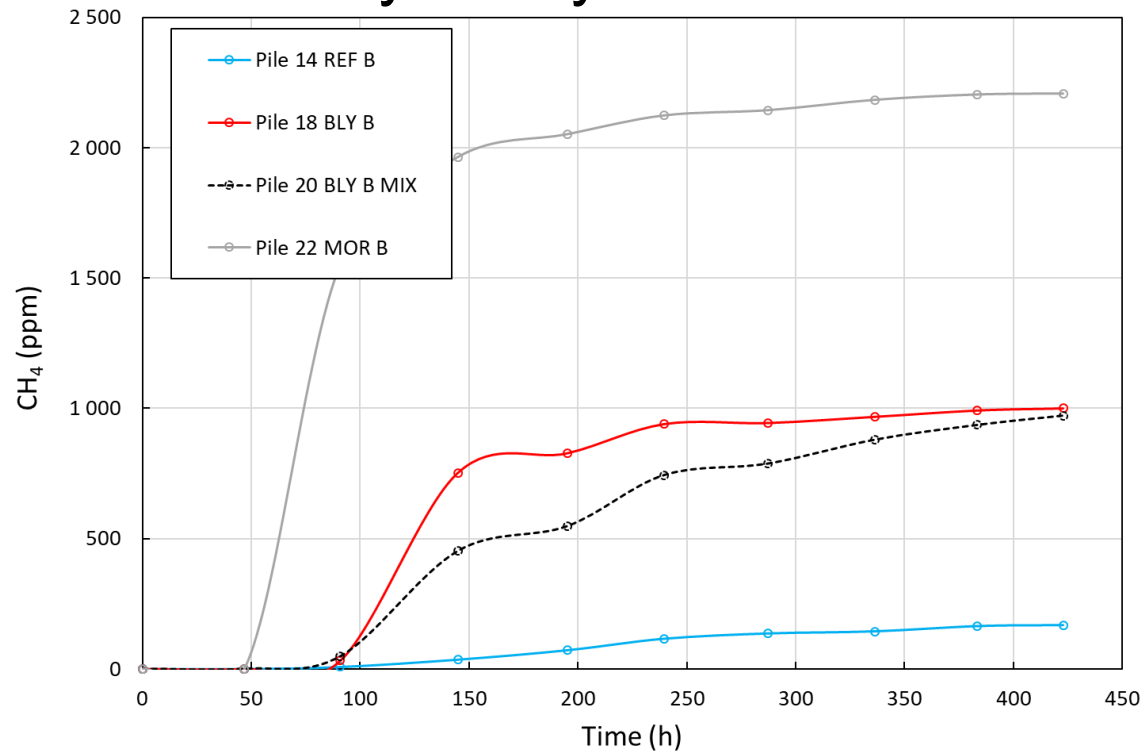


## Belt dryer + drum dryer

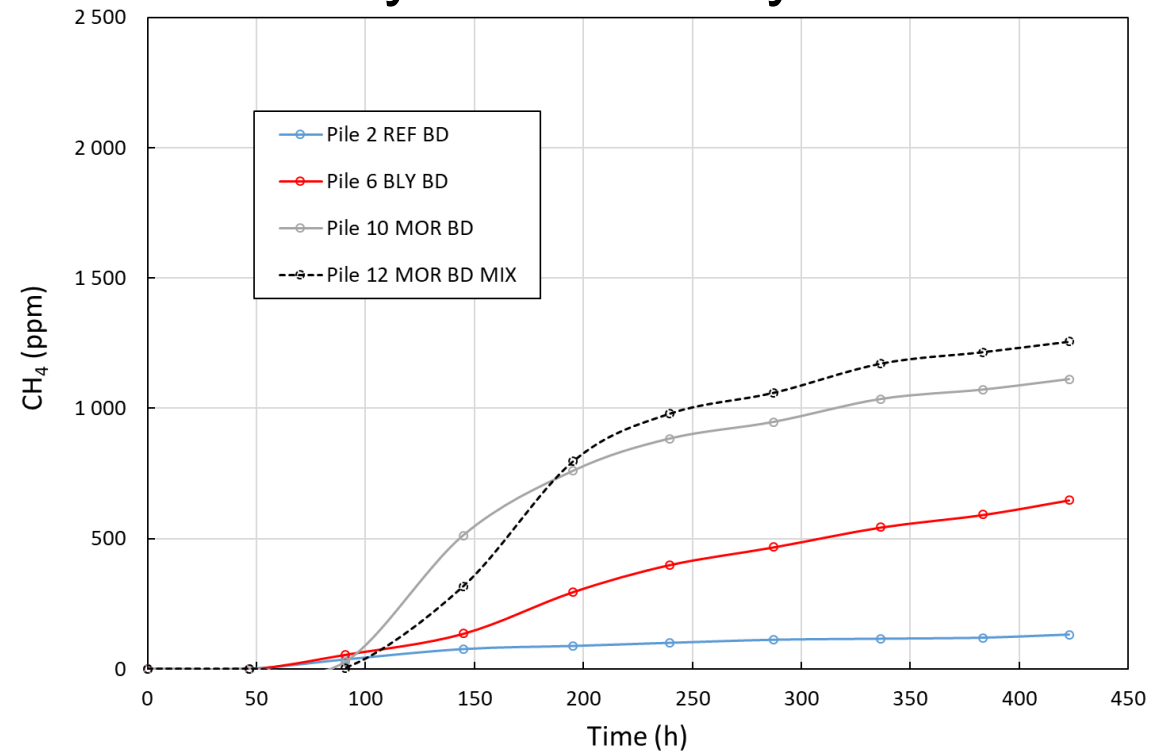


# Results: CH<sub>4</sub> emissions in pellet piles

## Belt dryer only



## Belt dryer + drum dryer



## Conclusions so far

- Blyberg, small diameter sawdust, gives the best pellet quality
- Using only belt dryer gives better pellet quality but more off-gassing at pellet storage
- Mora, large diameter sawdust, gives more self heating and off-gassing at pellet storage
- Storage of fresh sawdust is still a good method for reducing self-heating and off-gassing in pellet storage
- Do we need to store all sawdust?



## Next step

- Similar trial at Härjeåns Energi AB in Sveg, preliminary in May 2023
- 3 different materials (REF, BLY, MOR)
- Härjeåns Energi is using a super heated steam dryer (180 °C)





# Thank you for your attention!



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Project: 47997-1 "SVINPELS"

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