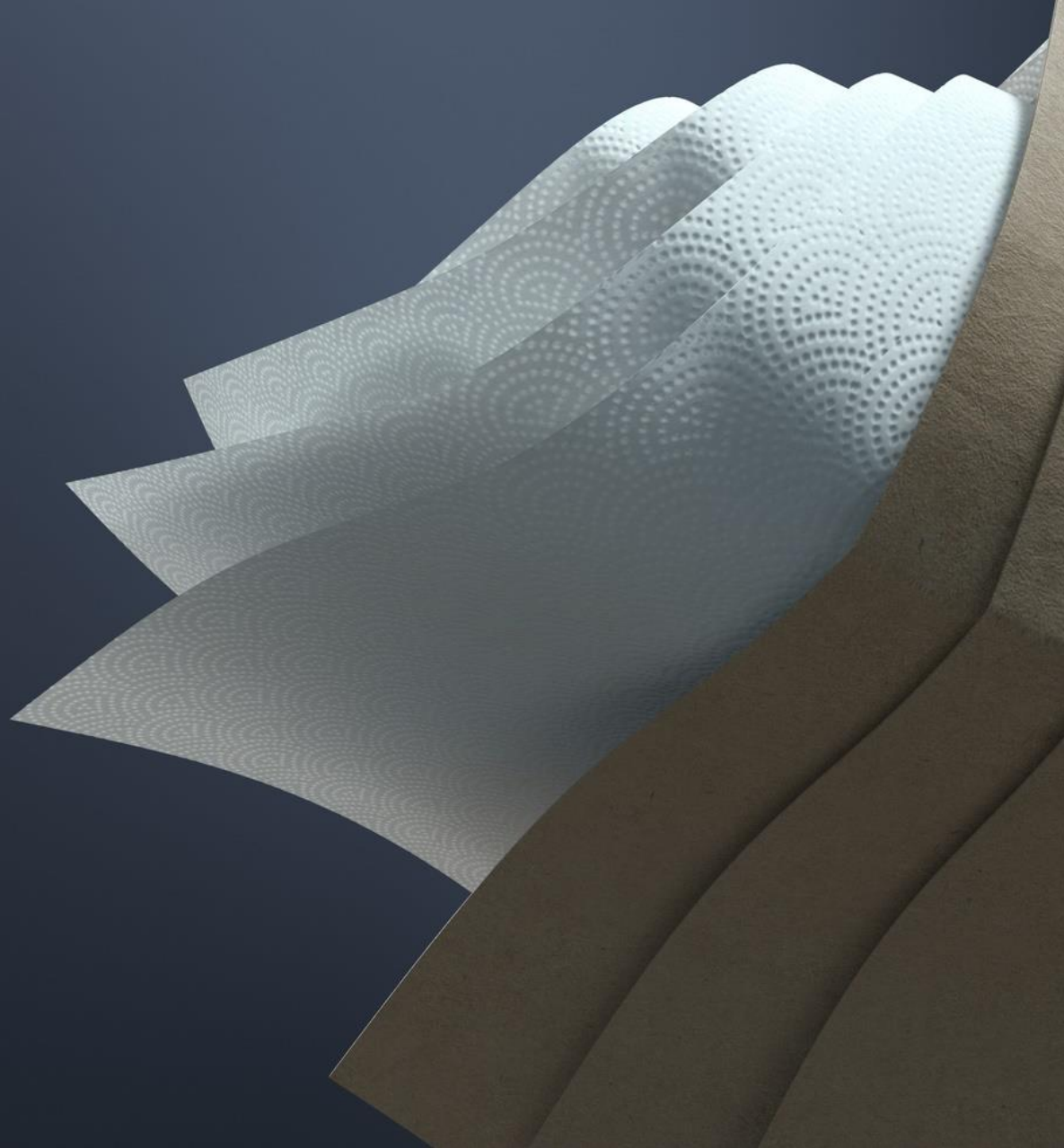


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The convenient 'Pump&Go' solution for superior dry strength

51st INTERNATIONAL ANNUAL SYMPOSIUM DITP 2025

kemira



Content

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Dry strength

Dry strength is a key quality requirement, with an essential role in:

- End product functionality and specifications
- Runnability in converting
- Selling price of the paper

Why use dry strength additives?

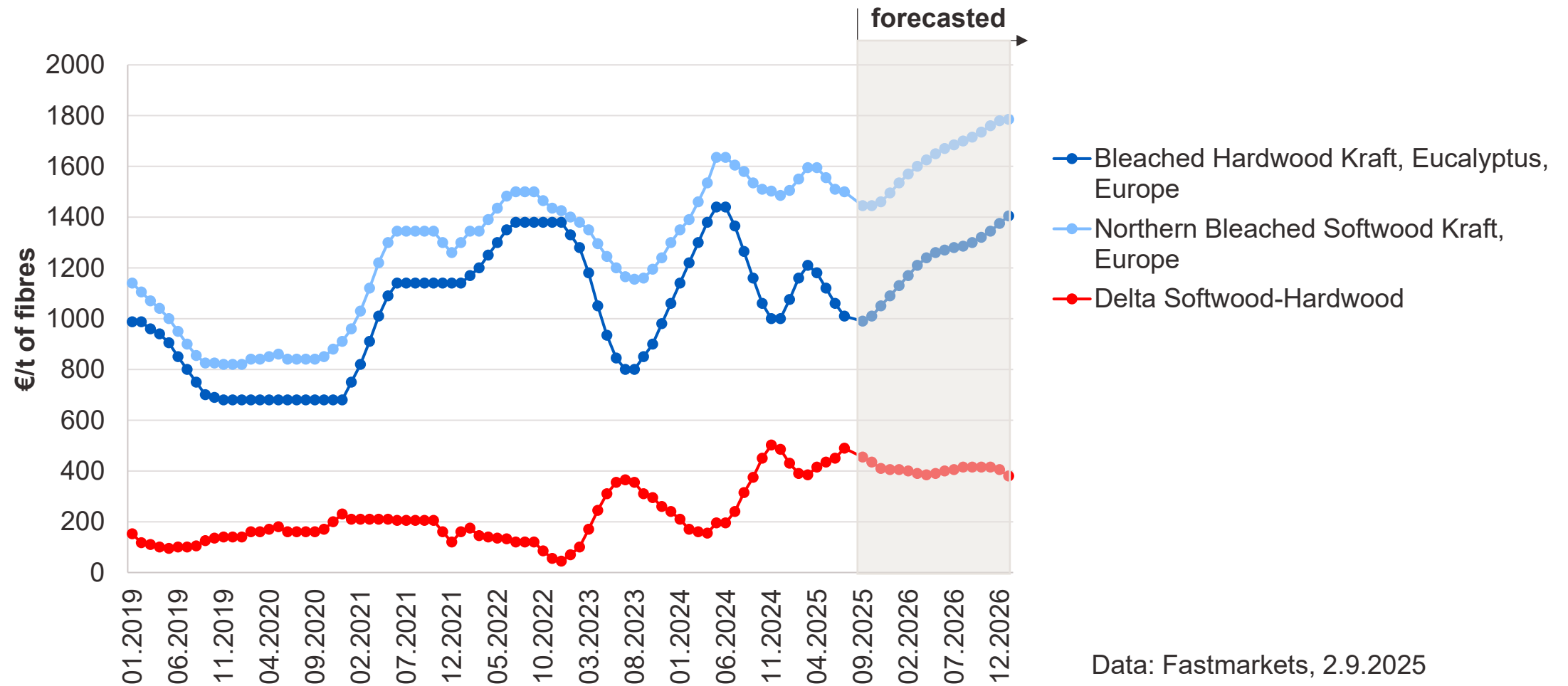
- “It’s all about money”
 - › Production costs
 - › Runnability costs
 - › Raw material costs
 - › “Out of spec” production
- Competitive edge → new, innovative products



Key drivers for using dry strength agent

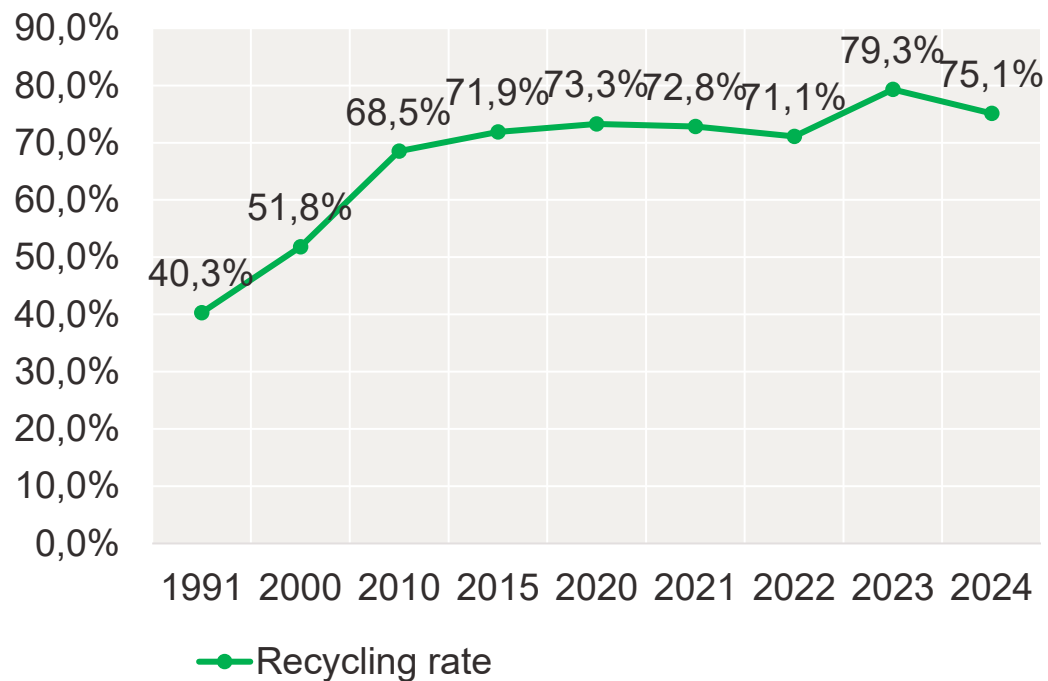
VIRGIN FIBRES	RCF	ENERGY COSTS	DEVELOPMENT OF NEW PAPER GRADES
Price gap between strong long fibres and short fibres	Continuous decline of RCF fibre quality Cost pressure to use cheap fibre quality	Rising energy expenses drive efficiency needs	Kraftliner substitutes “Lightweighting” of board Difficulties to reach quality specifications

Price gap between long and short fibres



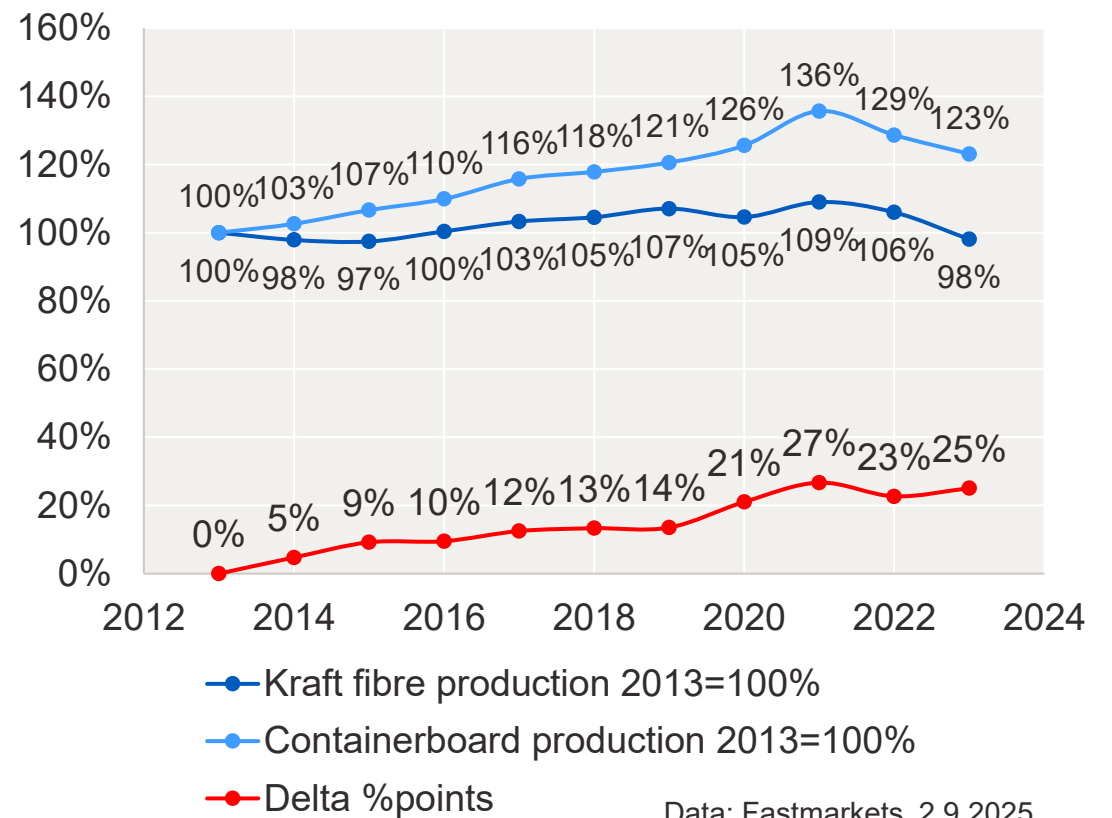
RCF quality

RECYCLING RATE (EU TARGET: 76%)



Data: CEPI 2024

CONTAINER BOARD PRODUCTION VS. KRAFT FIBRE PRODUCTION



Data: Fastmarkets, 2.9.2025

Overview on common dry strength concepts

	Onsite G-PAM	Ready to dose G-PAM	Cationic wet end starch	Surface starch
Dosage	Onsite preparation at mill	Pump & Go	Starch cooker or ~20% low molecular weight solution	Film press or size press, starch cooker
Physical form	Solutions	Solution	Powder or solution	Powder
Strength gain	15-20%	10%	15-20%	15-30%
Limitations	Equipment costs, handling of glyoxal in paper mill	Limited strength increase	High conductivity > high charged cationic starch	Film- / size press needed
Influence on PM system charge (Zeta/PCD)	Less anionic	Less anionic	Less anionic	None
Typical dosages	0,5-2 kg/t active	0,5-2 kg/t active	5-15 kg/t active	1-4 g/(m ² *side) active

“The convenient 'Pump & Go' solution for superior dry strength”

FENNOBOND™ 777E	
Dosage	Pump & Go, 1 component strength system
Physical form	Solution, 18–20% solids
Strength gain	15–20%
Limitations	Product volume which needs to be handled at big machines
Influence on PM system charge (Zeta/PCD)	None
Typical dosages	1-3 kg/t on active
Regulatory status	BfR, FDA, GB 9685, Nordic Ecolabel, EU Ecolabel, possible to produce BioMB version (biogenic content >50%)

Case Studies

Napkins: less dusting and improved dry strength generate fibre cost savings



200 k€/year net savings	-25% long fibres
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MACHINE OPERATION Crescent Former tissue machine Double layer Head Box Machine 1500 m/min 100% virgin, long and short fibers	CUSTOMER CHALLENGE Replace long fibers by cheaper short fibers at same or higher strength. Reduce dusting in converting to increase productivity.
KEMIRA SOLUTION AND RESULTS 8 l/t FennoBond™ 777E dosed before mixing pump enabled an increase of short fibres by 100% at same strength and low dusting in converting increasing productivity by 60%.	

Impact on converting

Without FennoBond 777E, one reel converted



With FennoBond 777E, one reel converted



Tissue, fibre and energy savings: reduction of long fibres and grammage at reduced refining



MACHINE OPERATION

Twin wire tissue machine

Single layer Head Box
Machine 1600 m/min

100% virgin,
long and short fibers

CUSTOMER CHALLENGE

Replace long fibers by
increasing cheaper short
fibers.

Decrease energy
consumption.

KEMIRA SOLUTION AND RESULTS

12 l/t FennoBond™ dosed to refiner inlet.

Increased short fibres (50% → 75%), reduced grammage by 10%
at same or higher strength at reduced refining (-15 kWh/t)
while maintaining bulk.

4,6 M€/y
net savings

-50%
long fibres

Testliner: Enabling production of TL 1



+20% Burst	+20% SCT
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MACHINE OPERATION Gap former Single layer Head Box Machine 1300 m/min, >600 kt/y 100% RCF Conductivity ~7 mS/cm, PCD 1400 ueq/l, Zeta – 8 mV	CUSTOMER CHALLENGE Reach strength specification at TL 1 production
KEMIRA SOLUTION AND RESULTS 15 l/t FennoBond™ 777E dosed before machine chest. Paper specifications were <i>dependably</i> reached even when lower quality fibres were in use.	

Conclusions

 FennoBond™ 777E easy-to-use dry strength additive	 Introduction can be supported with lab studies in our application lab and at customer site	 High technical success rate low risks	 Low equipment costs	 High potential to gain significant strength at small efforts
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Thank you for your attention!

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