

# Enhancing Specialty Paper Properties with Unbleached Kraft Pulp



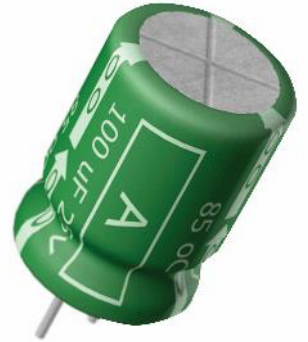
Bill Adams  
Sr. Director, Sustainability, Technical Services & Innovation  
Canfor Pulp



23 - 25 April 2018 Cologne, Germany Specialty Papers Europe 2018

# Table of Contents

- Introduction to Canfor Pulp
- Unbleached Pulp Market Segments
- Bleached versus Unbleached
- Product Enhancements with UBK
- Benchmarking UBK pulps



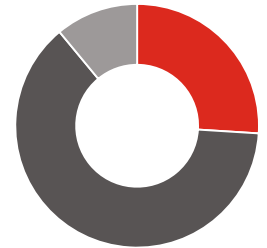
**North American roots,  
with a global vision.**

## Who we are

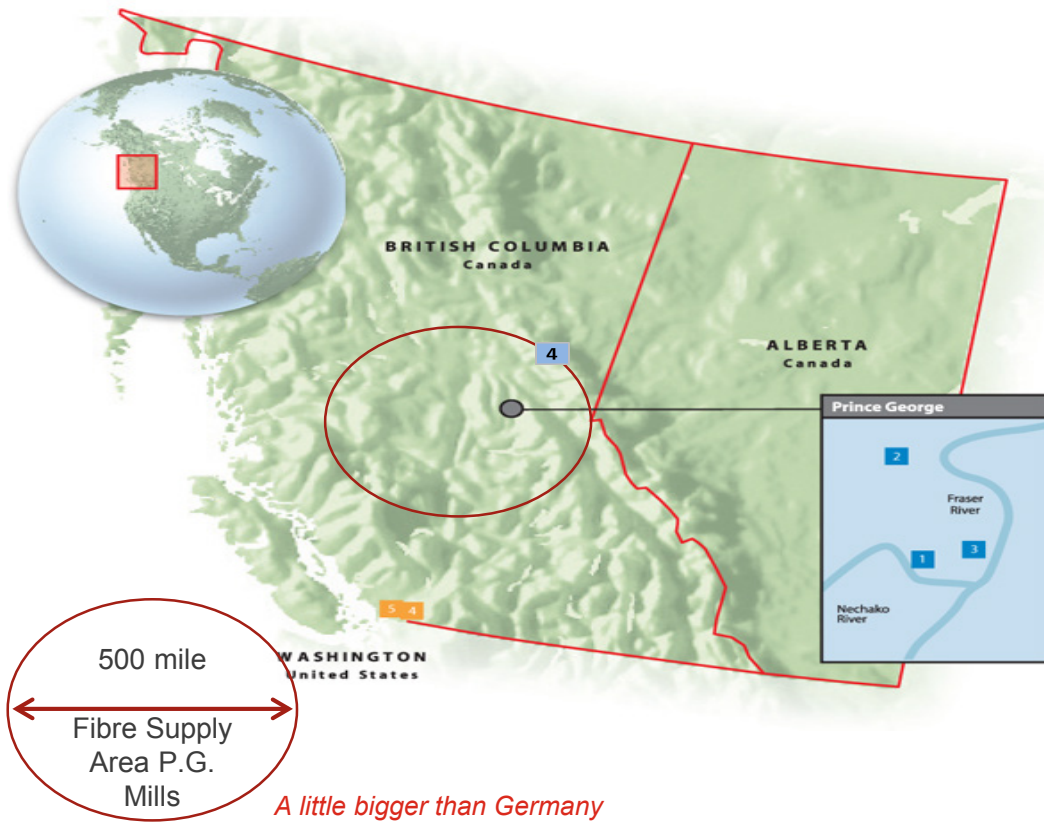
- 2nd largest global producer of softwood lumber
- Fifth largest producer of NBSK worldwide, largest in North America
- Global leader for NBSK to specialty paper segments
- Innovation Center with state of the art measuring equipment and refining knowledge
- Company with top quartile mills, strong reputation for sustainability, quality, customer service and excellence in logistics support
- **Manage 21 million hectares of certified forests**

**2017 Pulp Sales  
\$1.2 Billion**

- Americas
- Asia
- Europe



# Canfor Pulp Overview Canfor



Mills	Capacity	Key Products
1. Intercontinental	330,000	<b>NBSK</b>
2. Northwood	650,000	<b>NBSK</b>
3. Prince George	150,000	<b>UBSK</b>
3. Prince George	140,000	<b>Kraft Paper</b>
4. Taylor	220,000	<b>BCTMP</b>
5. Canfor Head Office		
6. Canfor Pulp Innovation		

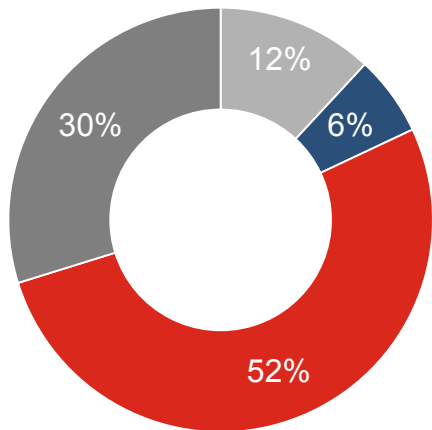
**The unique fiber comes from the regional sawmills.**



# Canfor Pulp – NSK Sales by End Use

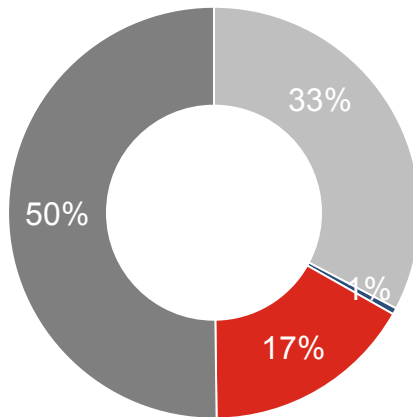
Canfor Pulp's goal is 60% of our fiber used in specialty applications by 2020

2007



- Tissue
- Publishing
- Commodity
- Specialty

2017



- Tissue
- Publishing
- Commodity
- Specialty

■ Tissue

Branded top quality lightweight tissue

■ Other

■ Publishing

Magazines, Catalogues

■ Specialty

Teabags, Filters, Electrical Grades, Abrasive Paper, Cigarette Paper, Masking Tape, Fibre Cements, Wet-laid non-woven, Wall Paper, Décor, metallized labels

# Unbleached Pulp Market Segments

## Electrical (transformer, cable, capacitor)

- high tensile strength, purity, breakdown strength and elongation
- Low ash content and conductivity



## Fibre Cement

**Specialty Paper** (abrasive papers, masking tape, food applications, liquid packaging, filtration, etc.)



**Commodity** (paper & packaging)



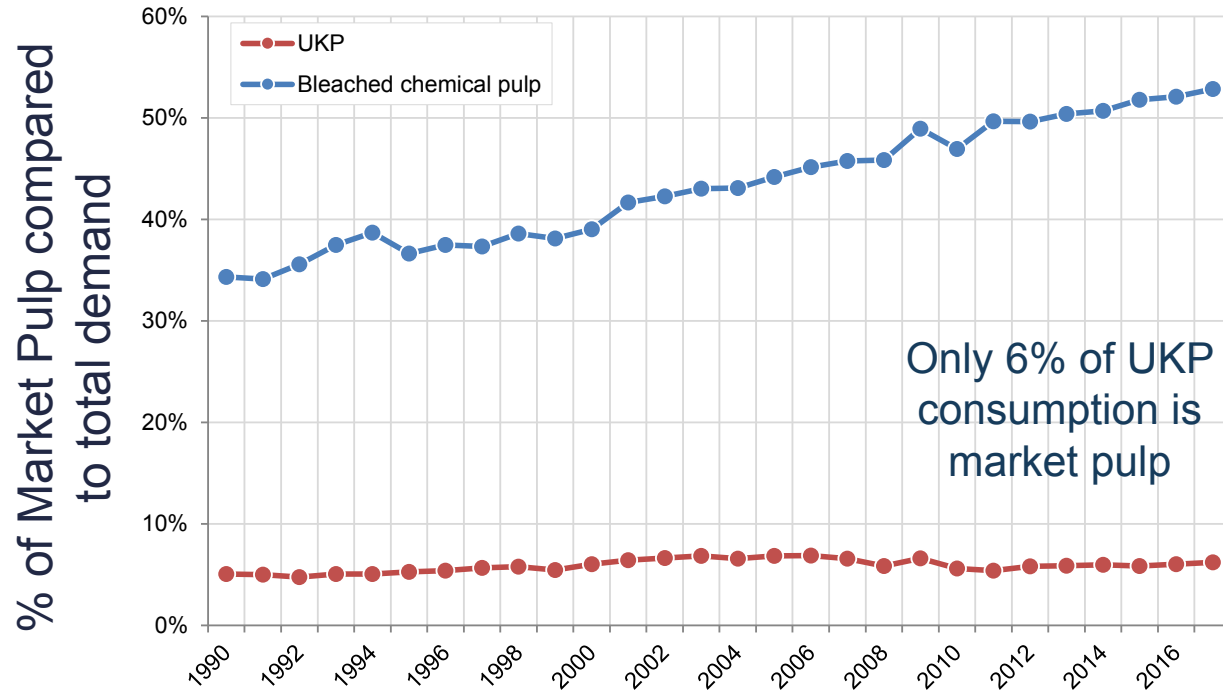


# Unbleached kraft pulp demand by end use

## UBK demand by end use

	Total UBK	Specialty	Paper & Board	Fibre Cement	Electrical
North American	185	5	5	160	15
West Europe	220	20	30	75	95
East Europe	60	10	15	20	15
Latin America	50	5	12	18	15
Oceania	42	3	4	30	5
Japan	165	10	65	45	45
China	550	15	440	40	55
Other Asia	650	20	420	170	40
<b>Total</b>	<b>1922</b>	<b>88</b>	<b>991</b>	<b>558</b>	<b>285</b>

# UKP & BCP Market Pulp Demand as a % of Total Demand



Over 50% of Bleached Chemical pulp demand is market pulp

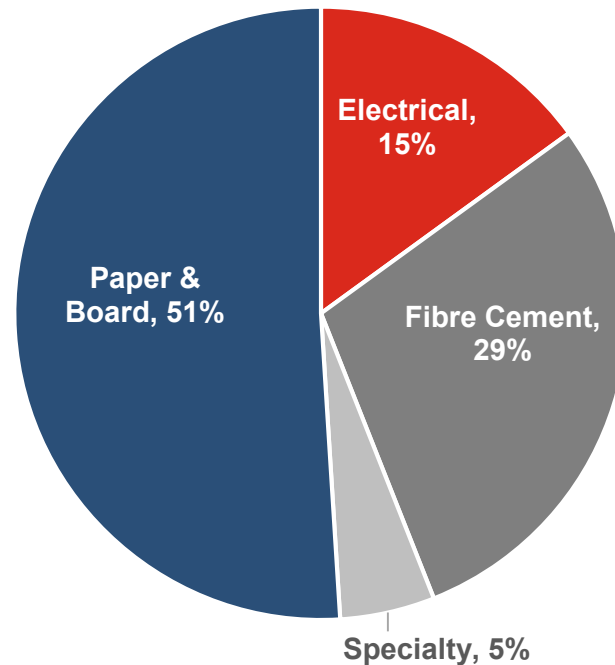
Only 6% of UKP consumption is market pulp



# Relative Market Size by Grade, 2017 (market pulp)

- UBK is a 2 million tonne market
- UBK is almost exclusively a softwood market

## Unbleached Market Pulp





# Sustainability Attributes

Natural brown unbleached products can have consumer appeal in some market segments

Growing trend in the food applications and packaging sector as a sustainability initiative

- Less bleaching chemicals and wood
- Lower carbon footprint

Key property now includes printability

- Low shives, low dirt, good formation



Arla's EKO organic dairy brand



# UBK Specialty Paper – Quality is Key

- Consistent Quality
- Cleanliness  
(Low shives count and dirt contamination)
- Strength
- Refining response
- Kappa (% of lignin content)
- Brightness and colour
- Chemical cleanliness
- Dimensional stability



# Specialty Paper Application – HVAC Desiccant Paper

## Background

**Product:** Rotary Desiccant Dehumidifier Paper

**Raw material:** 50% BSK / 50% clay

## Objectives

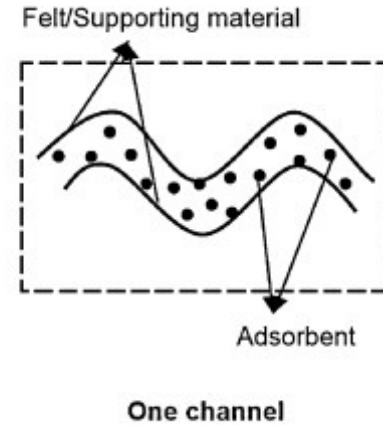
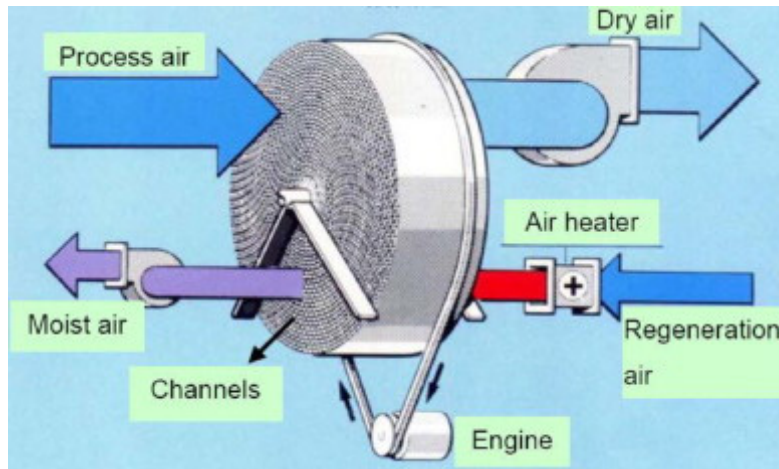
Increase tensile strength and % solids

## Trial Design

Replace Premium NBSK with UBK to achieve tensile strength requirements and increase solids to 55%.

## Key Result

Strength requirements achieved. Increase in solids to 55% achieved



# Strength Attributes of UBK

- Masking Tape
- Abrasive Tape Base Papers
- Filter Papers
- Liquid Packaging
- Interleaving Papers
- Food Applications

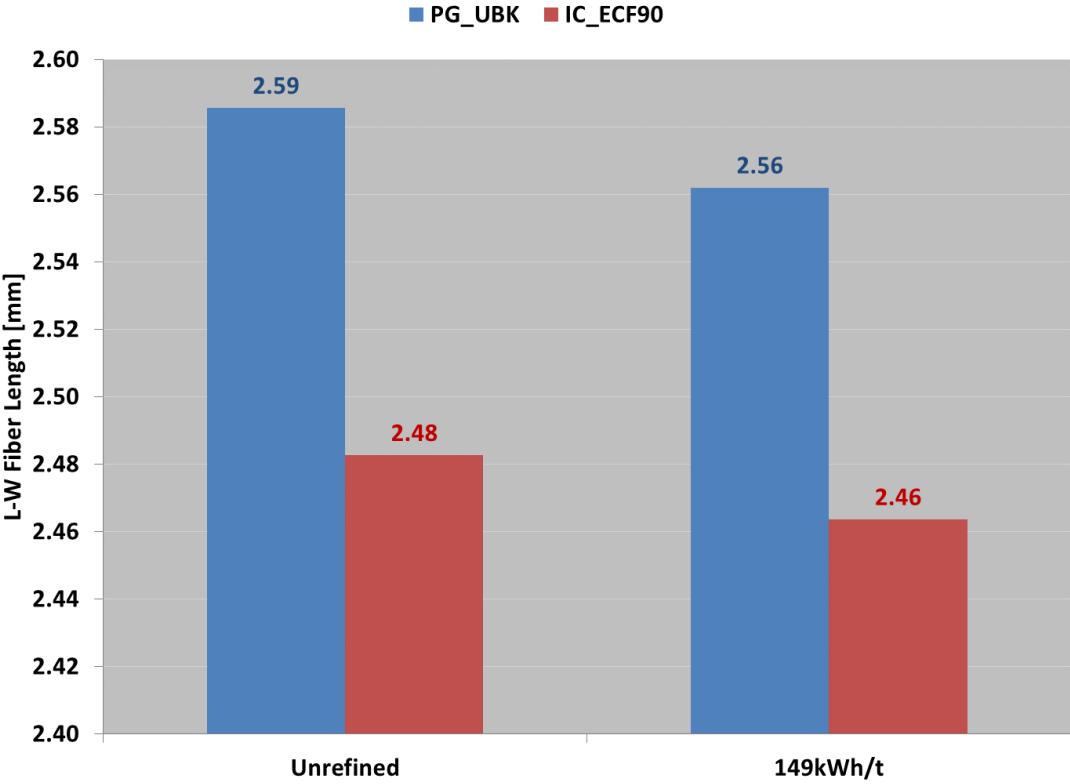


# Bleach versus Unbleached Kraft Pulp

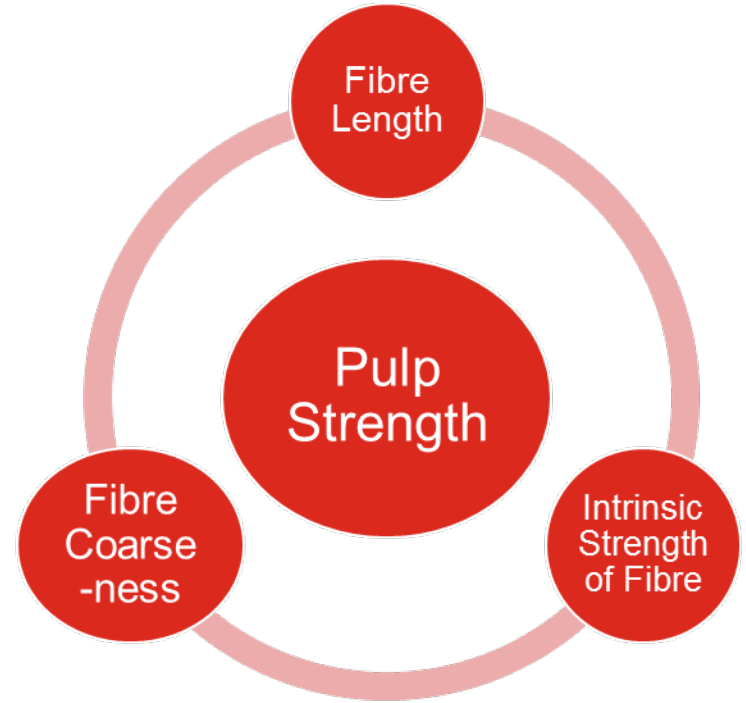
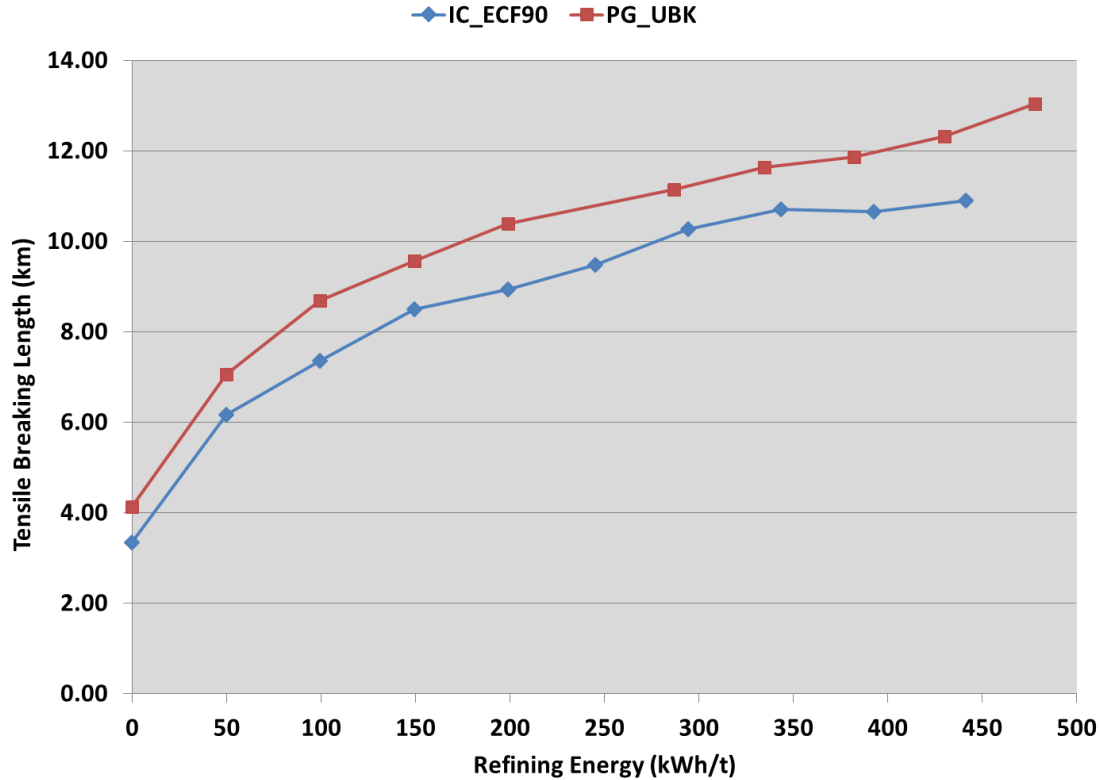
Property	Unbleached	Bleached	% Difference
Wall thickness (um)	8.2	7.8	4.9%
Intrinsic Viscosity (mL/g)	1109	728	34.4%
Kappa Number	26.8	3.2	88.1%
Water Retention Value (%)	1.59	1.43	10.1%
Thickness (um)	122	113	7.4%
Bulk Density (cm <sup>3</sup> /g)	1.9	1.79	5.8%
Tensile Strength (kN/m)	1.92	1.74	9.4%
Stretch (%)	2.1	3.4	-61.9%
Tensile Energy Absorption (J/m <sup>2</sup> )	30.9	47.3	-53.1%
Tensile Stiffness (kN/m)	296	241	18.6%
Breaking Length (m)	3038	2806	7.6%
Tear Strength (mN)	1302	1284	1.4%

Most of the properties of the unbleached pulp fibres were superior to those of the bleached ones, except the stretch and tensile energy absorption, which were higher for the bleached pulp fibres.

# Fibre Length

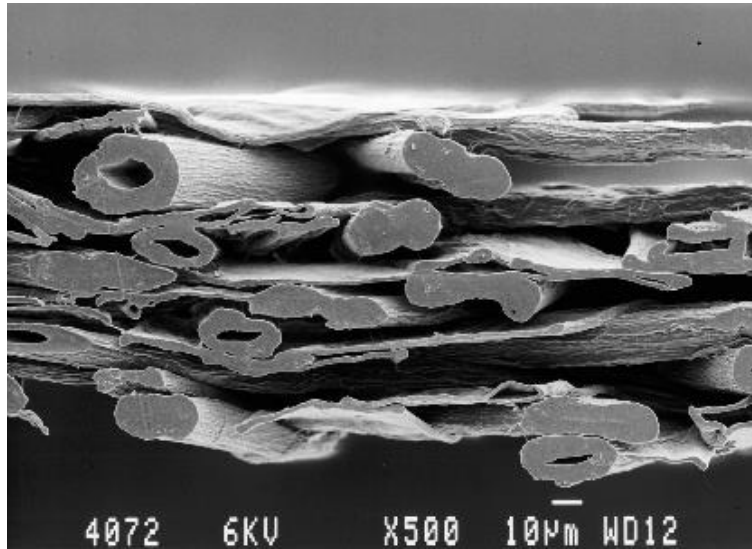


# Bleached versus Unbleached Kraft Pulp

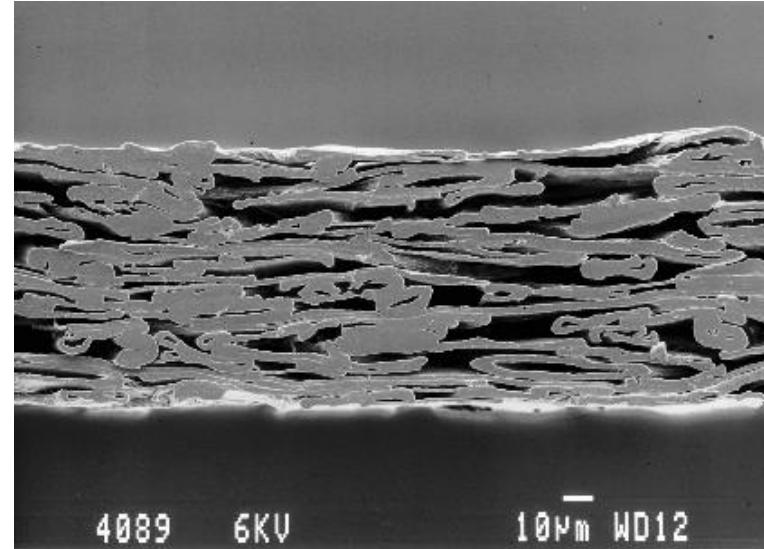




# Importance of Fibre Coarseness



Coarse Fibre  $\approx$  18,9 mg/100 m

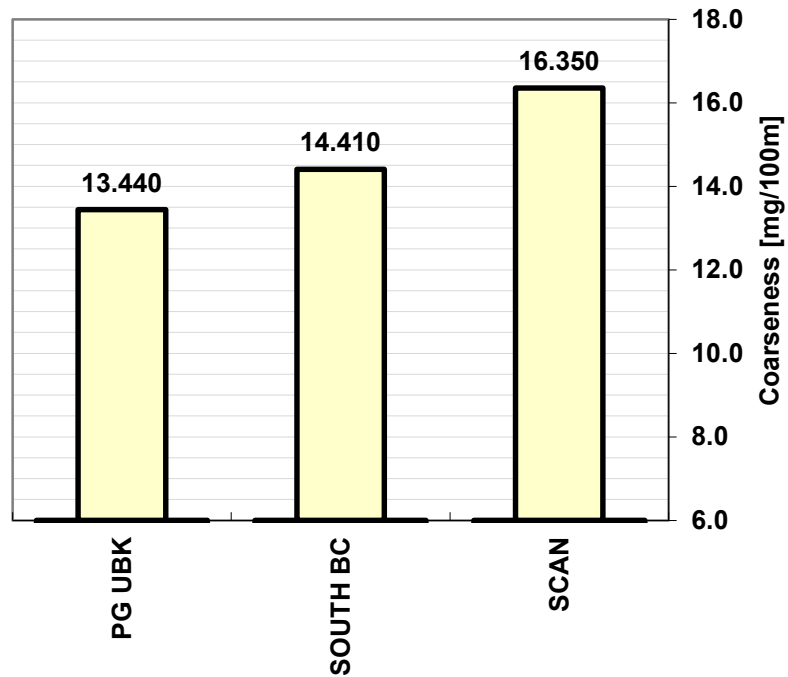


Fine Fibre  $\approx$  10,0 mg/100 m

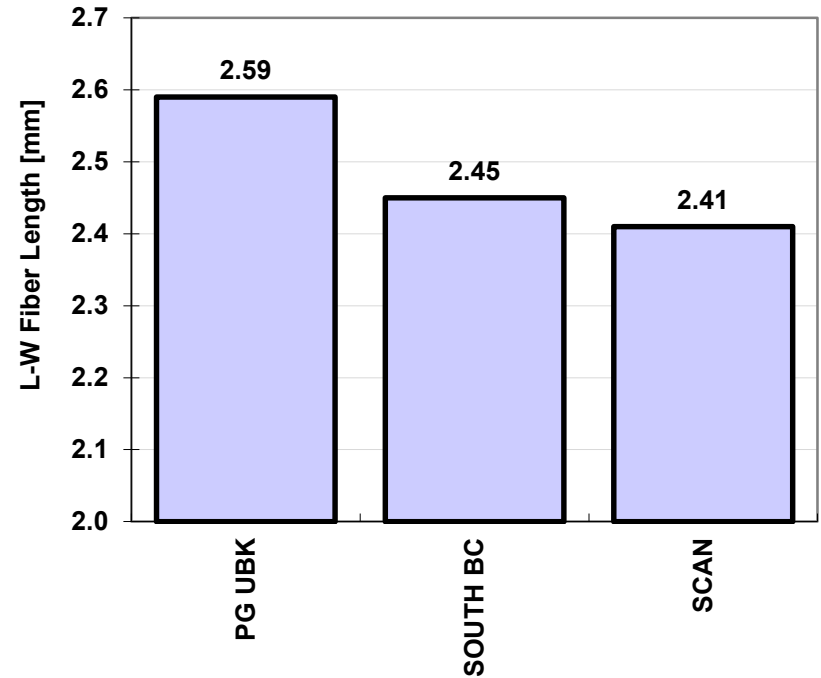
Thin-walled (fine) fibres have the ability to collapse more easily.

# Benchmarking Fibre Properties of UBK Pulps

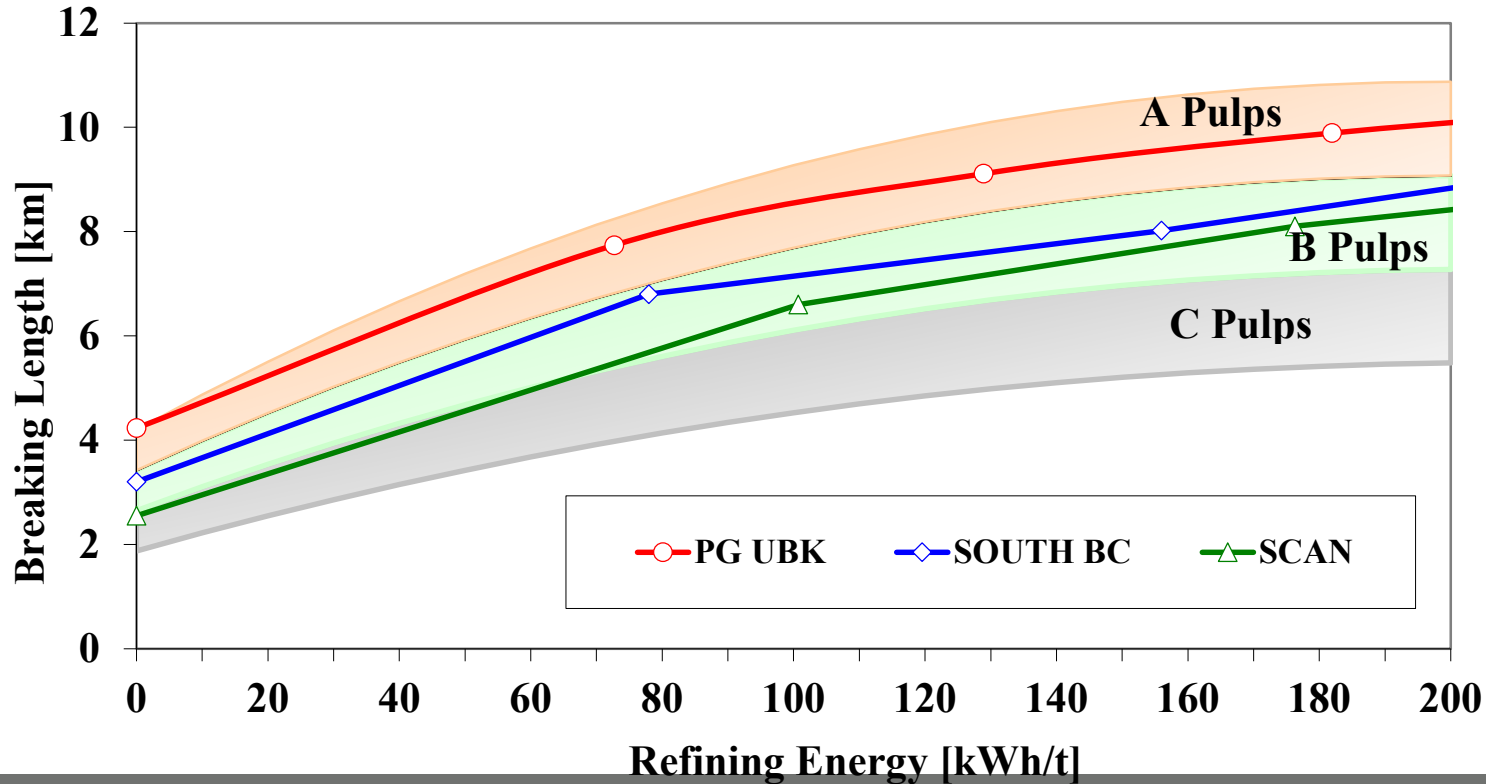
## Fiber Coarseness



## Fiber Length



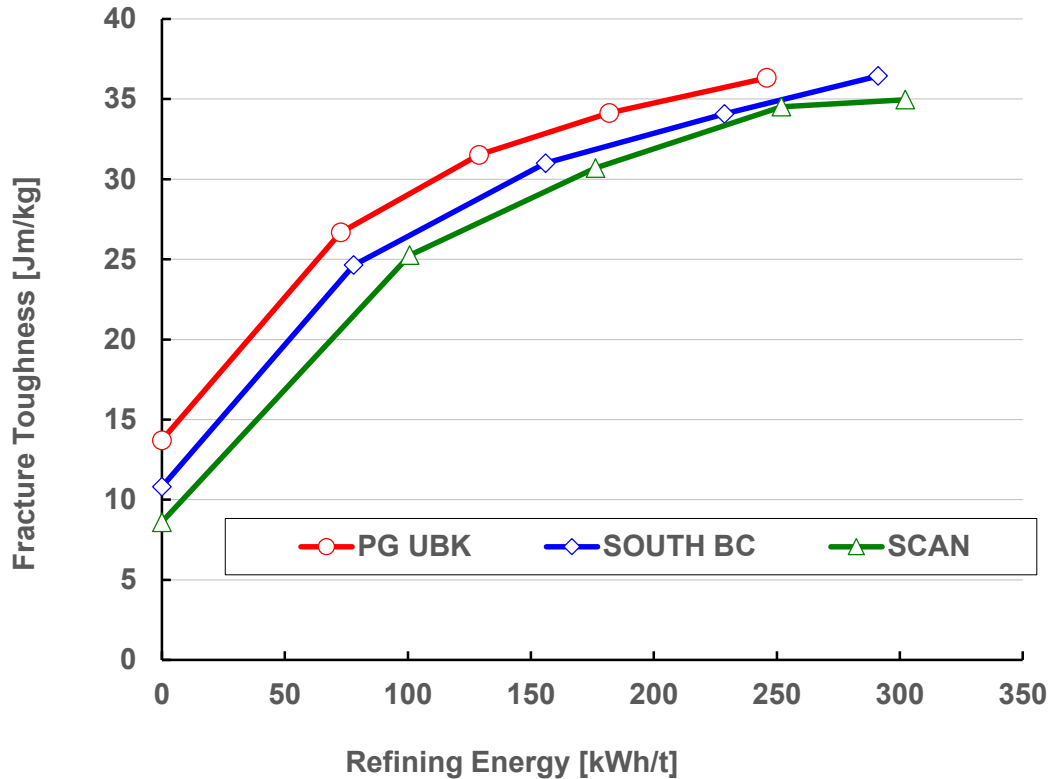
# Breaking Length vs. Refining Energy



PRP fibres provide the specialty paper producer with the benefits of reduced refining, improved dimensional stability and higher tensile strength.



## Fracture Toughness vs. Refining Energy



### Fracture Toughness

Fracture energy index (Jm/kg) is the critical fracture energy release rate divided by the paper grammage.

Unlike tensile strength, paper fracture toughness is a fundamental material property, which always measures the resistance against the crack propagation along the crack line.

# Key Learnings

1. The specialty paper segment that utilizes UBK is a growing niche market that requires premium quality
2. Sustainability of UBK can enhance marketing branding
3. High quality unbleached kraft pulp can enhance specialty paper performance
4. Premium Reinforced Pulps (PRP) from Northern Canada can offer a unique value proposition for specialty paper makers



Thank You



23 - 25 April 2018 Cologne, Germany Specialty Papers Europe 2018