



ALEXIUM

Strategic Growth Priorities

Dr Bob Brookins, CEO

Jason Lewis, CFO

15 October 2019

Alexium: Background



Performance chemicals provider for advanced materials applications

- IP-driven products to address market needs
- Application expertise to take innovations to market

Innovation model driven by responding to the customer's needs

- Work closely with customers to develop product designs with meaningful marketing claims
- Unique expertise in application of analytical tools to guide product designs
- Forward-looking multifaceted market analyses
- Industry specific expertise

Expertise in key markets with multiple revenue opportunities

- Mattress & top-of-bed markets
- Military & workwear uniform markets

Key Features of Alexium Business Model

Company founded on deep Technical Expertise

- 24 employees with 150+ year in chemistry
- 5 PhDs + 10 graduates math/science

Product manufacturing through Tolling Partners

- Rapidly scale with growth of the business
- Negligible CapEx to support growth

Industry Expertise of Executive Leadership Team



Dr. Bob Brookins – Chief Executive Officer and Managing Director

- Worked over the past 18 years in materials science and synthesis of polymers/specialty products.
- Led the development and commercialization of Alexium’s phase change material (“PCM”) platform technologies and the Alexicool® product line
- Involved in multiple facets of the business, including working with customers on product design and marketing, analyzing markets to assess opportunities, and planning for logistics and supply-chain management.
- Co-invented Alexium’s flame retardant (“FR”) technologies for military uniforms and formaldehyde-free, flame retardant products for cotton-based materials.



Jason Lewis – Chief Financial Officer

- Worked over the past 22 years in specialty chemical company for mining, fertilizer, phosphate, asphalt and oil/gas industries.
- Established a strong track record of value creation by way of revenue growth through pricing, long-term customer contracts, cost optimization through analysis tools, negotiation of services, department restructuring, debt management and working capital reduction through controls and process improvements. He also has strong international experience including greenfield start-ups.

Key Positions in Management Team



Allen Reihman – Chief Commercial Officer

- Worked over 20 years in markets for polymers/specialty chemicals.
- Served as Director of New Business Development for Invista where he led all phases of an innovation program, including product development, manufacturing, intellectual property, pricing strategies, branding, business planning, and strategic alliances. Previously served as Director of Commercial Development for five global specialty chemical businesses at Invista.
- Worked for seven years at Eastman Chemical where he held a range of commercial leadership roles in corporate development, global P&L general management, innovation, and market development.



Richard Estes – Vice President, Technology Development

- Worked over 25 years in the fields of chemistry and material science with market expertise in coatings, photovoltaics, textiles, leather and foam.
- Established strong experience in the convergence of material properties, product applications and manufacturing processes, driving product performance for customer solutions.
- Authored 24 granted patents and multiple technical articles during his career.

FY 2019: Executed to our strategic plan

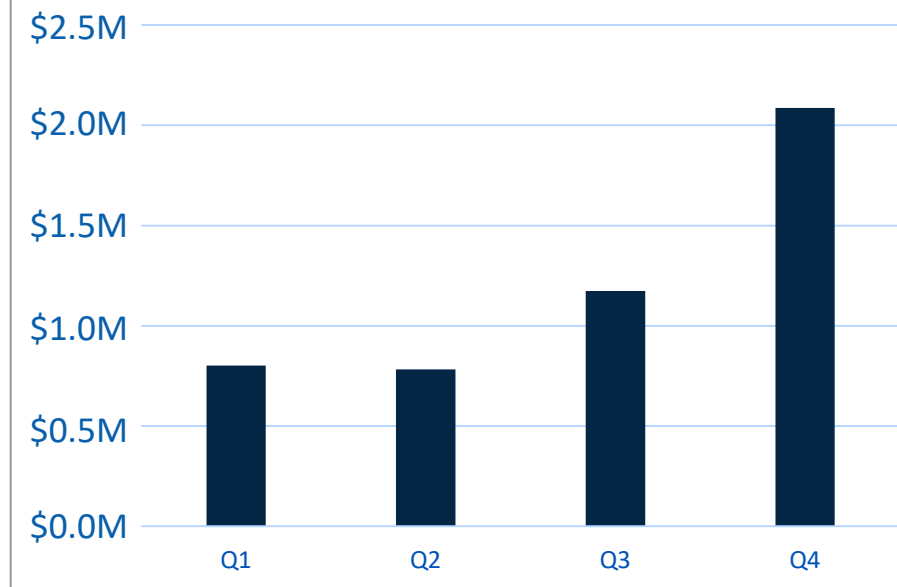
Repositioned the business

- Refocused on **high-margin** cornerstone initiatives
- Exited unprofitable business lines

Signed contracts with strategic partners

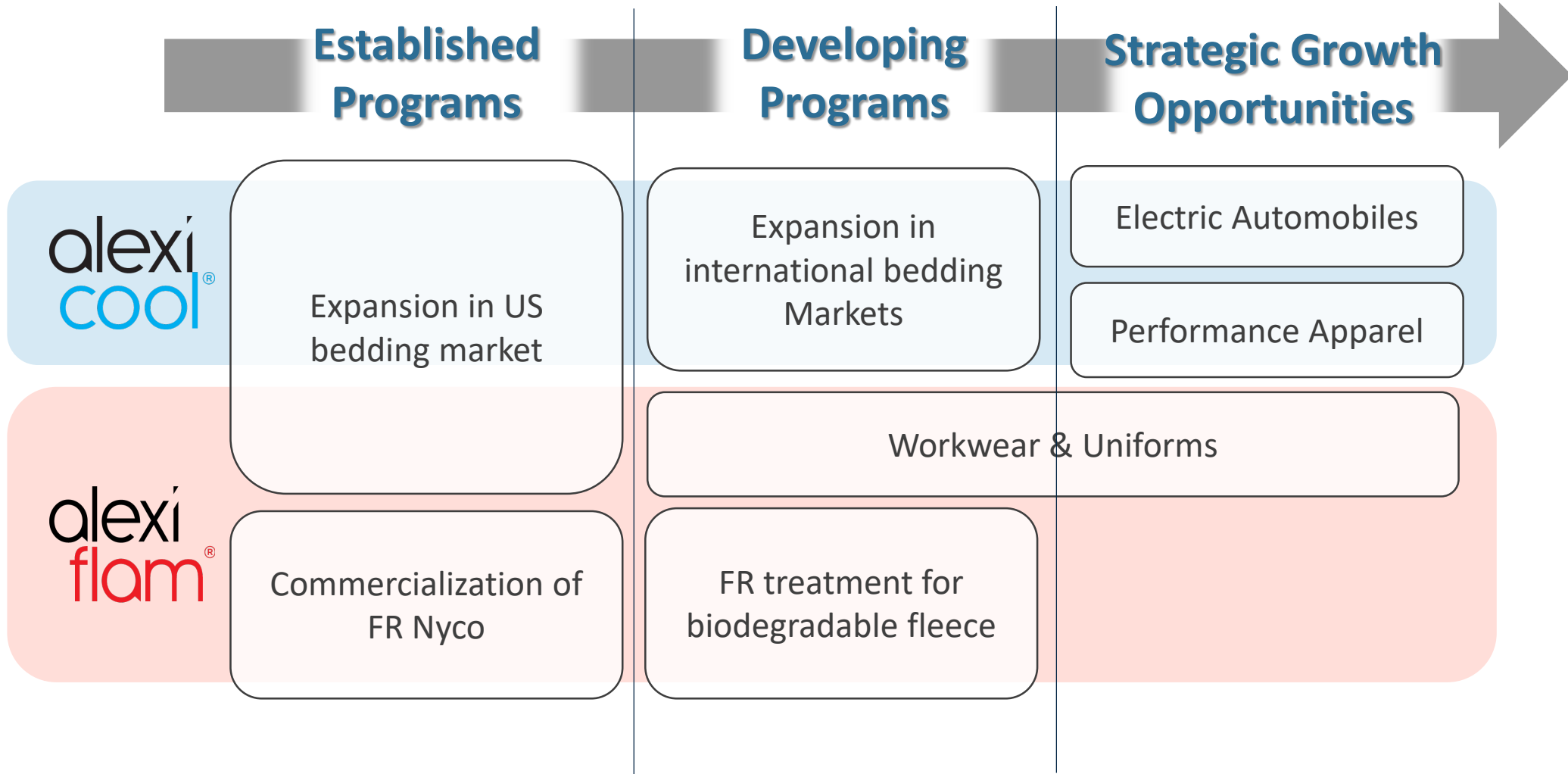
- **Major North American mattress brand** selected Alexicool® as the key phase changing material (PCM) ingredient for its mattresses
- **Development Agreement** with **Pine Belt Processing** for flame retardant applications for military uniforms
- **Memorandum of Understanding (MoU)** signed with **ICL** for the distribution of Alexiflam® NF
- **Two-year Supply Agreement** signed with **Pegasus Home Fashions** to provide Alexicool® products for its top-of-bed applications

Quarterly Cash Receipts in FY 2019



All monetary numbers are reported in USD

Strategic Plan: FY2020 to FY 2023





Strategy 1 Expansion of Current Position in US Bedding Market

Established Program

Current Position in US Bedding Industry

Established Program



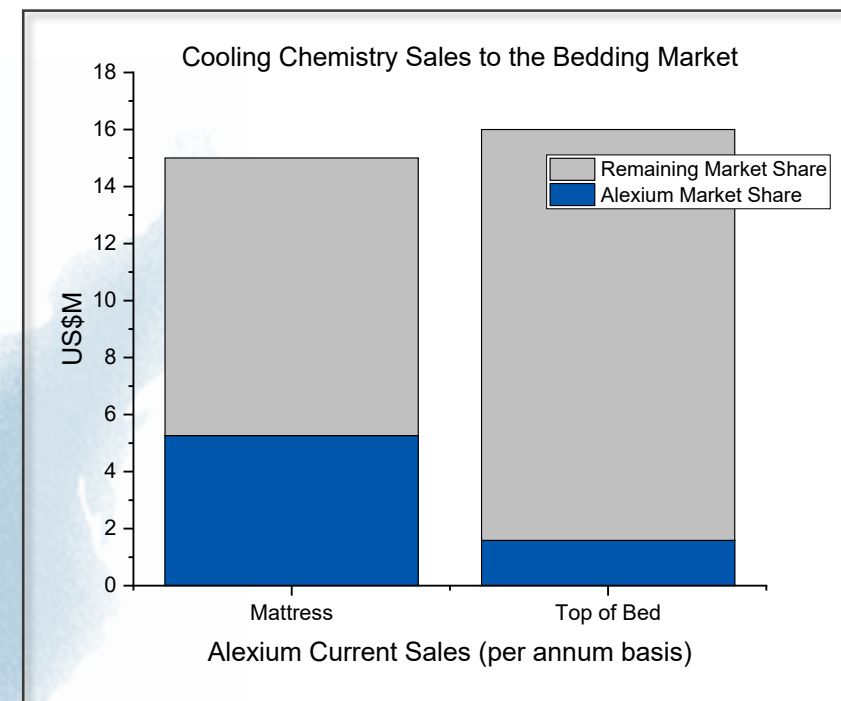
Current Market Share

Over the past 18 months, Alexium has increased its market position significantly in key textile markets

- mattresses (35% market share)
- top-of-bed products (12% market share)

Alexium's Market Value

- Analytics-driven marketing claims
- Systems approach to thermal regulation
- Partnering with customers from product design to manufacturing
- Broad range of application methods to textiles



Two additional factors will drive further growth in US Bedding cooling chemical sales

- Annual growth in US mattress sales (CAGR: 6.4%)¹
- Expansion of cooling technologies into broader bedding market (CAGR: 4-15%)²

¹ Technavio, [Global Mattress Report: 2019-2023](#)

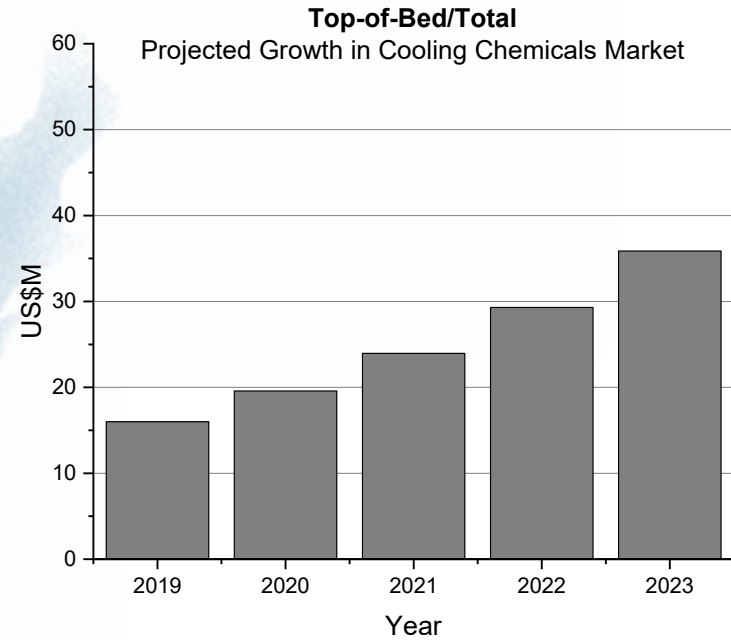
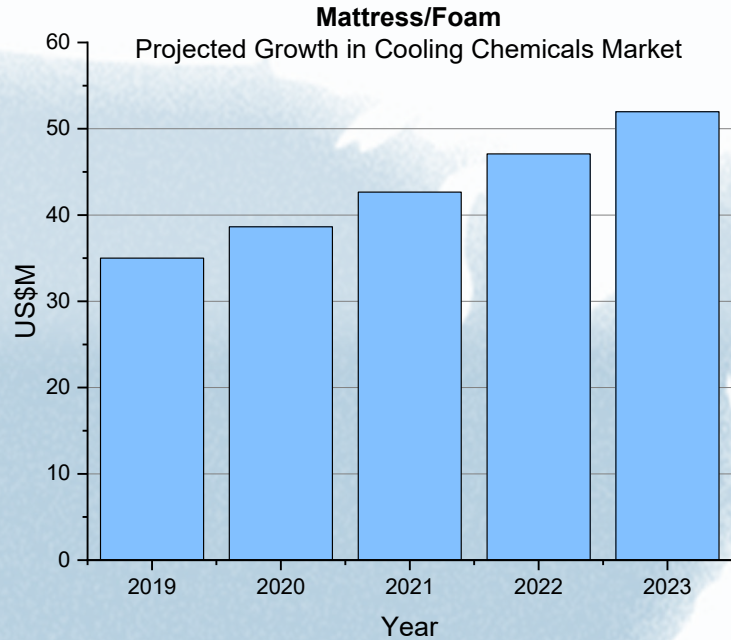
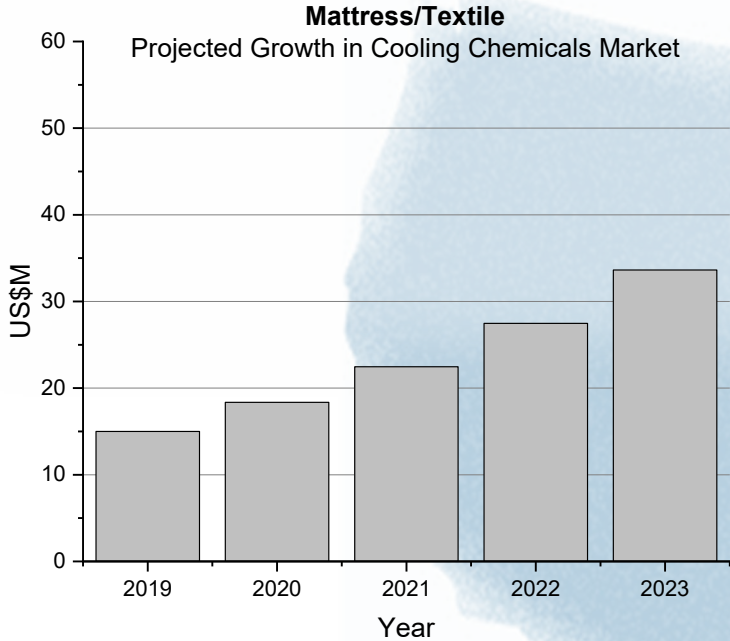
² Accuray Research, [Global Advanced Phase Change Material \(PCM\) Market Analysis and Trends: Industry Forecast to 2025](#)

All monetary numbers are reported in USD

US Bedding Industry: Market Sizes and Forecasted Growth



Alexium has targeted three key markets for revenue growth^{1,2}



GROWTH STRATEGY – LEVERAGE POSITION IN TEXTILE/MATTRESS MARKET

- Primary areas of growth are foam and top-of-bed markets
- Current sales pipeline value of \$45M per annum
- Further growth through expansion of the product portfolio in bedding markets

All monetary numbers are reported in USD

1 Technavio, [Global Mattress Report: 2019-2023](#)

2 Accuray Research, [Global Advanced Phase Change Material \(PCM\) Market Analysis and Trends: Industry Forecast to 2025](#)

US Bedding Industry: Alexiflam® NF Opportunity

Established Program



Opportunity Description

- Foam mattress requires an FR sock made from a high cost glass fiber¹
- The glass fiber poses respiratory hazards for consumers and difficulties for manufacturers
- To resolve these issues, Alexiflam® NF can be applied to a standard cotton/polyester fabric for FR sock applications
- Addressable Market: \$55M

Advantages of Alexiflam® NF-Based FR Socks		
Description	Incumbent Product	Alexiflam® NF based Product
Cost per sock (queen)	\$18	\$12
Non-aspirating hazard		✓
Glass-fiber free		✓
Durable/wash-resistant treatment	✓	✓
Patent-pending product		✓

All monetary numbers are reported in USD

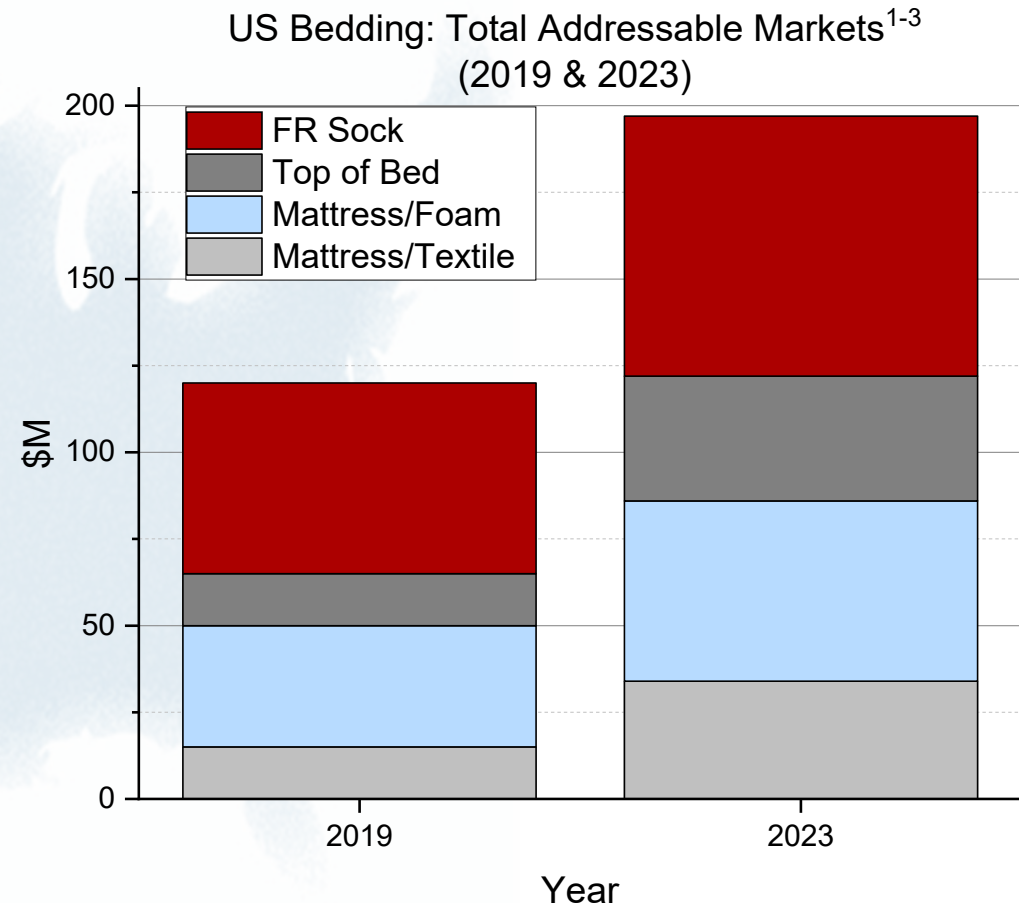
¹ BCC Research, *Flexible Foam: Global Markets (May 2018)*

US Bedding Strategy: Leverage Current Position



OVERVIEW

- Current market share in mattress/textile: **35%**
 - Current market share in mattress/textile expected to grow further
 - Comparable growth is expected for other Alexicool® markets
- Current pipeline of opportunities with Alexium's commercial team represent **\$45M** per annum.
- Additional revenue growth drivers:
 - Growth of the mattress industry
 - Expansion in the range of products using cooling chemistries.
- Sum of addressable markets in US Bedding is **\$120M (2019)**



All monetary numbers are reported in USD

1 Technavio, [Global Mattress Report: 2019-2023](#)

2 Accuray Research, [Global Advanced Phase Change Material \(PCM\) Market Analysis and Trends: Industry Forecast to 2025](#)

3 BCC Research, [Flexible Foam: Global Markets \(May 2018\)](#)



Strategy 2 Commercialization of FR NyCo technology for military applications

Established Program



Alexiflam[®] FR NyCo Technology

Established Program

Application to nylon/cotton (NyCo) fabrics for military uniforms

Alexiflam[®] FR NyCo Technology is a proprietary set of chemistry for wash-durable flame retardation of nylon/cotton fabrics commonly used for military uniforms.



Key Alexiflam[®] FR benefits



Effective FR
performance on 50/50
NyCo



Patented chemistry
developed by
Alexium



Production viable FR
NyCo has been a
market gap for decades



Successes in FR NyCo
are a paradigm shift in
the market

Alexiflam® FR NyCo Technology

Established Program



Application to nylon/cotton (NyCo) fabrics for military uniforms

VALUE PROPOSITION

- Self extinguishes, forming a strong char
- No holes or cracks in char
- No melting or dripping
- Improved fabric properties (e.g., tear strength, hand) over incumbent FR fabrics
- Industrially launderable



Char region of burned FR NyCo sample

Current Status in Military Uniforms

Established Program



Growth Strategy

Two Elements to FR NyCo Strategy:

- 1) Alexium partnership with Pine Belt Processing, current supplier to US Military
- 2) Rapid adoption by key segment(s) of the US military then drive further growth

Opportunity Details

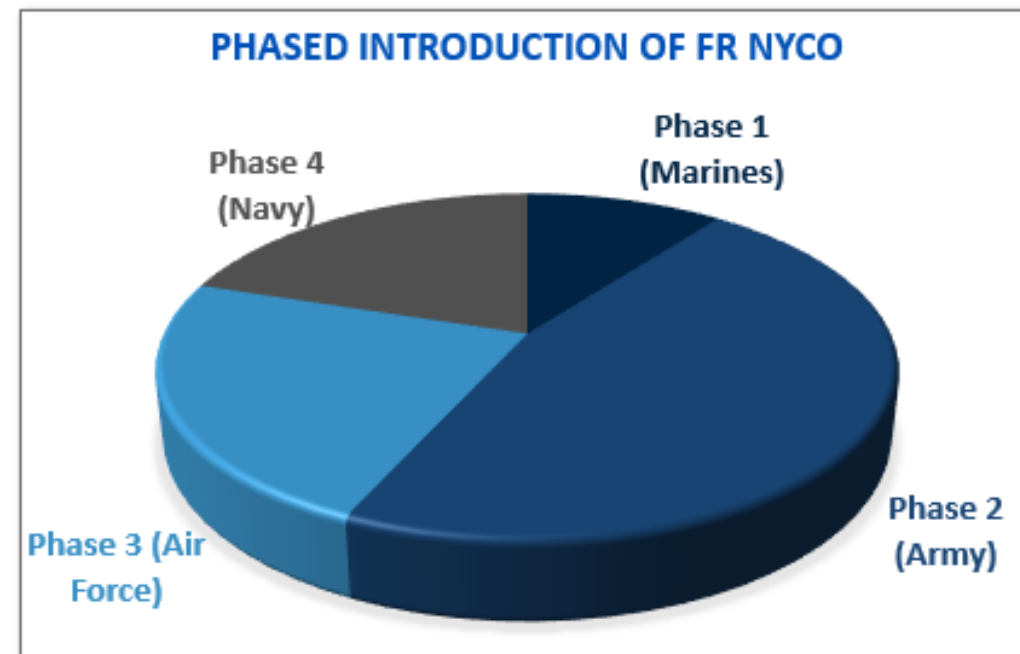
Total Addressable Market: \$90M per annum

Phase 1

- \$10M per annum
- Alexium aims for completion of this development work in FY 2019
- Rollout commencing FY 2020

Phase 2

- \$45M per annum
- This phase runs parallel to Phase 1
- Alexium/Pine Belt strategy is to leverage Phase 1 successes to drive Phase 2



Size represents number of military personnel per branch¹

¹ Wikipedia, [United States Armed Forces](#) (Accessed October 11, 2019)

All monetary numbers are reported in USD

Phase 1 Process and Milestones



STAGE #	STATUS
Stage 1: Adapt Alexium's FR ACU tech design to General Uniform Specifications	✓
Stage 2: Demonstrate 25x industrial launderability	✓
Stage 3: Sign development Agreement with Pine Belt Processing	✓
Stage 4: Define and verify primary specifications (e.g., flame retardancy, launderability)	✓
Stage 5: Complete development of commercialized product	✓
Stage 6: Scale up at Pine Belt facility	In process
Stage 7: Conduct military testing & evaluation (T&E)	

CURRENT WORK – STAGE 6

Scale up at Pine Belt facility

- Production work at Pine Belt has been proceeding very well and in accordance with our schedule
- Last milestone is manufacturing 30 pounds of production scale goods to initiate Stage 7

NEXT – STAGE 7

Military Testing and Evaluation (T&E)

- This stage will consist of three milestones
 1. T&E of 0.5m² fabrics
 2. T&E of shirt & trousers
 3. Limited User Evaluation
- Alexium's role is minimal in this stage



Strategy 3
Expansion of Applicable
Markets for Alexiflam[®]
products

Developing Program

Alexiflam® NF

Flame-treatment for cotton-rich materials

Alexium recognized that established FR cotton technologies are simply too complicated and require too much nuance and developed to address this gap with a disruptive technology

Benefits of Alexiflam® NF

- ✓ Simplified process
- ✓ Durable finish (50+ laundering cycles)
- ✓ Effective flame retardancy
- ✓ Essentially formaldehyde free



GROWTH STRATEGY

Focus on applications where Alexiflam® NF is a unique solution

Leverage Alexiflam® NF's improved manufacturability over incumbents

Alexiflam® NF for Biodegradable Fleece

Developing Program



Opportunity Description

- Synthetic fleece is widely used for consumer jackets and vests.
- Recent environmental studies show the synthetic fibers readily break and contaminate the environment¹
- Alexiflam® NF can be applied to standard cotton fleece to provide a biodegradable fleece garment
- Addressable Market: \$50M²

Advantages of Alexiflam® NF-Based Biodegradable Fleece	
Description	Alexiflam® NF Fleece
Fabric type	100% cotton
Add-on required	<5%
Passes FR standards	✓
Launderable	✓
Patent-pending product	✓



All monetary numbers are reported in USD

1 Outside Online [Patagonia's New Study Finds Fleece Jackets Are a Serious Pollutant](#) (June 29, 2016)
 2 Global Info Research, [Global Fleece and Jackets Market 2019 by Manufacturers, Regions, Types and Applications to 2024](#)

Alexiflam® NF for General Workwear

Developing Program



Focus on leveraging the cost/manufacturing benefits of Alexiflam® NF

- No specialized equipment required
- No hazardous products required (such as ammonia or peroxides)
- Frequent production shutdowns for maintenance are not required
- Reduced wastewater management

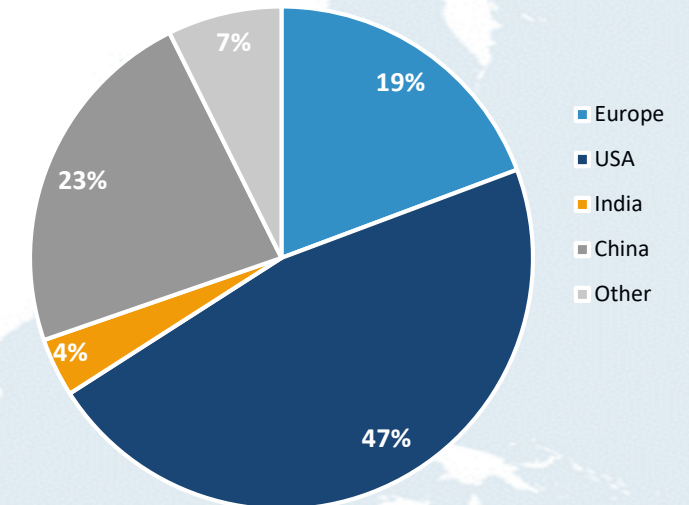
The following are key target markets for workwear applications

EMEA Market

Market size and strategic objectives

- Focus on Europe and India
- Market penetration in 2020 via distribution partnership with ICL
- FR cotton chemical market size: **\$60M**
- Successes in EMEA markets can then be leveraged to other markets

Global Production Market Share of Fire Resistant Cotton by Regions (2015)¹



Global FR cotton chemical market
\$250M per annum

All monetary numbers are reported in USD

¹ QYR Chemical and Material Research Center Global Fire Resistant Cotton Industry 2015 Deep Market Research Report

Alexiflam® NF Licensing Model



As previously announced, Alexium is working with ICL as a potential licensee of Alexiflam® NF. Sources of revenue are shown below:

BACKGROUND ON ICL

- Global specialty minerals and specialty chemicals company
- Industry leader in phosphorus- and bromine-based flame retardants
- \$5.6B revenue (2018)
- 11,000 employees worldwide
- Dual listing on NYSE and TASE

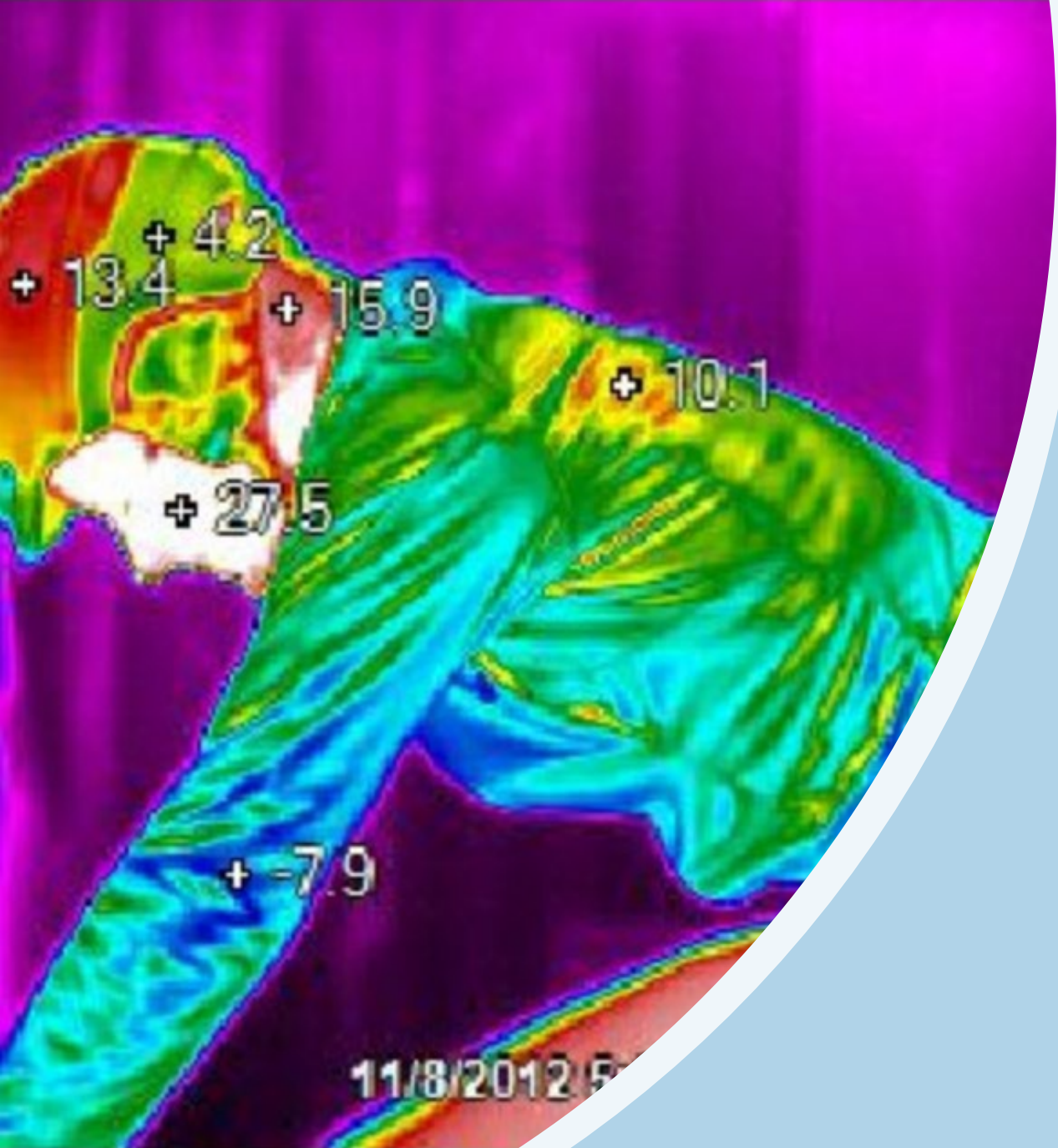
SOURCES OF REVENUE FROM LICENSING MODEL

- Revenue from Royalties¹
- Customer technical service
- Applications development
- Materials development



All monetary numbers are reported in USD

¹ KPMG Profitability and Royalty Rates Across Industries: Some Preliminary Evidence (2012)



Strategy 4

Expansion of Alexicool® products to broader regional and adjacent markets

Alexicool® Global Market Opportunities

Developing Program



China is a near-term strategic opportunity – planned entry in FY20

China Market

Mattress Industry Cooling Chemistry Usage

- Est. textile market size: **\$11M** per annum
- Est. foam market size: **\$24M** per annum
- Growing middle class to underpin rapid market growth
- Expansion to China further supports existing sales of Chinese exports to the US

Europe is a medium-term strategic opportunity

European Market

Mattress Industry Cooling Chemistry Usage

- Est. textile market size: **\$10M** per annum
- Est. foam market size: **\$20M** per annum
- A lower priority due to highly regionalized nature of the market

All monetary numbers are reported in USD

1 Technavio, [Global Mattress Report: 2019-2023](#)

2 Accuray Research, [Global Advanced Phase Change Material \(PCM\) Market Analysis and Trends: Industry Forecast to 2025](#)



Electric Automobiles¹

Value Proposition

- Critical metric for electric automobiles is the life of the battery
- Alexicool® products provide a **non-electric** means of controlling the interior temperature, thus reducing the battery drain from the air conditioner
- Value of analytical expertise readily translates to automotive industry

Opportunity Details

- 2 million vehicles were sold in 2018 globally.
- At that volume and with standard applications of Alexicool® products, the potential PCM sales is 4.6M pounds of chemistry a year at a value of \$21M per year.
- 13 millions vehicles are expected by 2025 (PCM sales potential of \$135M)



Performance Apparel¹

Value Proposition

- Cooling and comfort is integral to the performance apparel market
- Alexicool® products provide a durable cooling product to regulate body temperature under high physical exertion
- Value of analytical expertise readily translates to performance apparel industry

Opportunity Details

- Global sales of performance apparel totaled \$165B in 2017
- Based on standard applications of cooling technology, 10% integration into performance apparel products represents \$90M in cooling technology revenue

Alexium Vision for Growth



FY 2019

STRATEGY 1: US Bedding

- Supply agreements signed for Alexicool® products with major bedding manufacturer
- Supply agreements signed for Alexicool® products with Pegasus Home Fashions

STRATEGY 2: US Military Applications

- Agreements with Pine Belt Processing for military
- Complete development of commercialized product

STRATEGY 3 & 4: Growth of Target Markets

- MoU signed with ICL and received EPA approval

FY 2020

STRATEGY 1: US Bedding

- Further expansion of sales in three key markets (**\$45M sales pipeline**)
- Launch of Alexiflam® NF to FR sock market (**\$55M addressable market**)

STRATEGY 2: US Military Applications

- Complete T&E for Phase 1
- Prepare for rollout for Phase 1 (**\$10M - \$55M addressable market**)

STRATEGY 3 & 4: Growth of Target Markets

- Finalize licensing agreement and launch into EMEA workwear market (**\$60M addressable market**)
- Establish commercial/technical support for Alexicool® products in China

FY 2021+

STRATEGY 1: US Bedding

- Maximize position in US bedding market (**\$195M addressable market – 2023**)

STRATEGY 2: US Military Applications

- Broad adoption by US military (**\$90M addressable market**)

STRATEGY 3 & 4: Growth of Target Markets

- Broad expansion of Alexiflam® NF to global markets (including fleece) (**\$300M addressable market**)
- Expansion of Alexicool® products to international markets (**\$65M addressable market**)
- Expansion of Alexicool® product line to adjacent markets (**+\$100M addressable market**)

All monetary numbers are reported in USD



ALEXIUM

Contact:



InvestorRelations@AlexiumInternational.com

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