



Creating the Equation for Growth

# Opportunities in Natural Fiber Composites

**Lucintel Brief**

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**Lucintel**

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- ***Natural Fiber Composites Competitiveness and Market Opportunity***
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- ***About Lucintel***



# Executive Summary

- **Global natural fiber composites market reached \$2.1B in 2010, with compound annual growth rate of 15% in last five years**
- **Automotive & Construction were largest segment among all natural fiber composite applications**
  - **Bast fiber such as flax, Kenaf, hemp, etc. were the material of choice for automotive, whereas wood plastic composite was most preferred by building and construction players**
- **North American natural fiber composites market was the largest for wood plastic division whereas European region was leader in automotive segments– driven by Government support, environmental regulations, and customer acceptance**
- **By 2016, natural fiber composite market expected to reach \$ 3.8B (10% CAGR)**
- **Rising prices of petroleum based products, strong government support to eco-friendly products, higher acceptance and positive growth of end use industries, new housing numbers will drive natural fiber composites growth to new horizon**
- **Performance improvement in materials will drive growth for natural fiber composites in new application areas**
















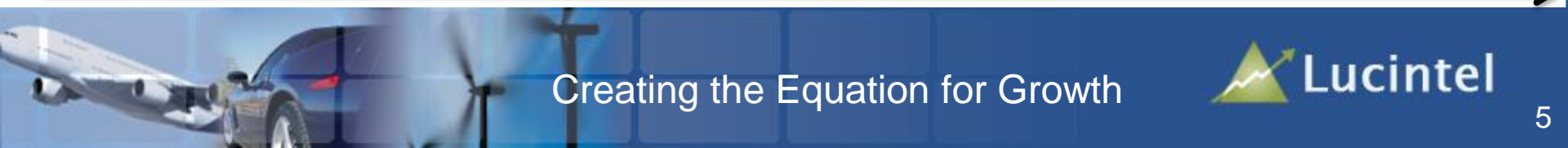
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# Evolution of Natural Fiber Composites: Henry ford developed first car with hemp fiber but due to economic limitations did not enter the market

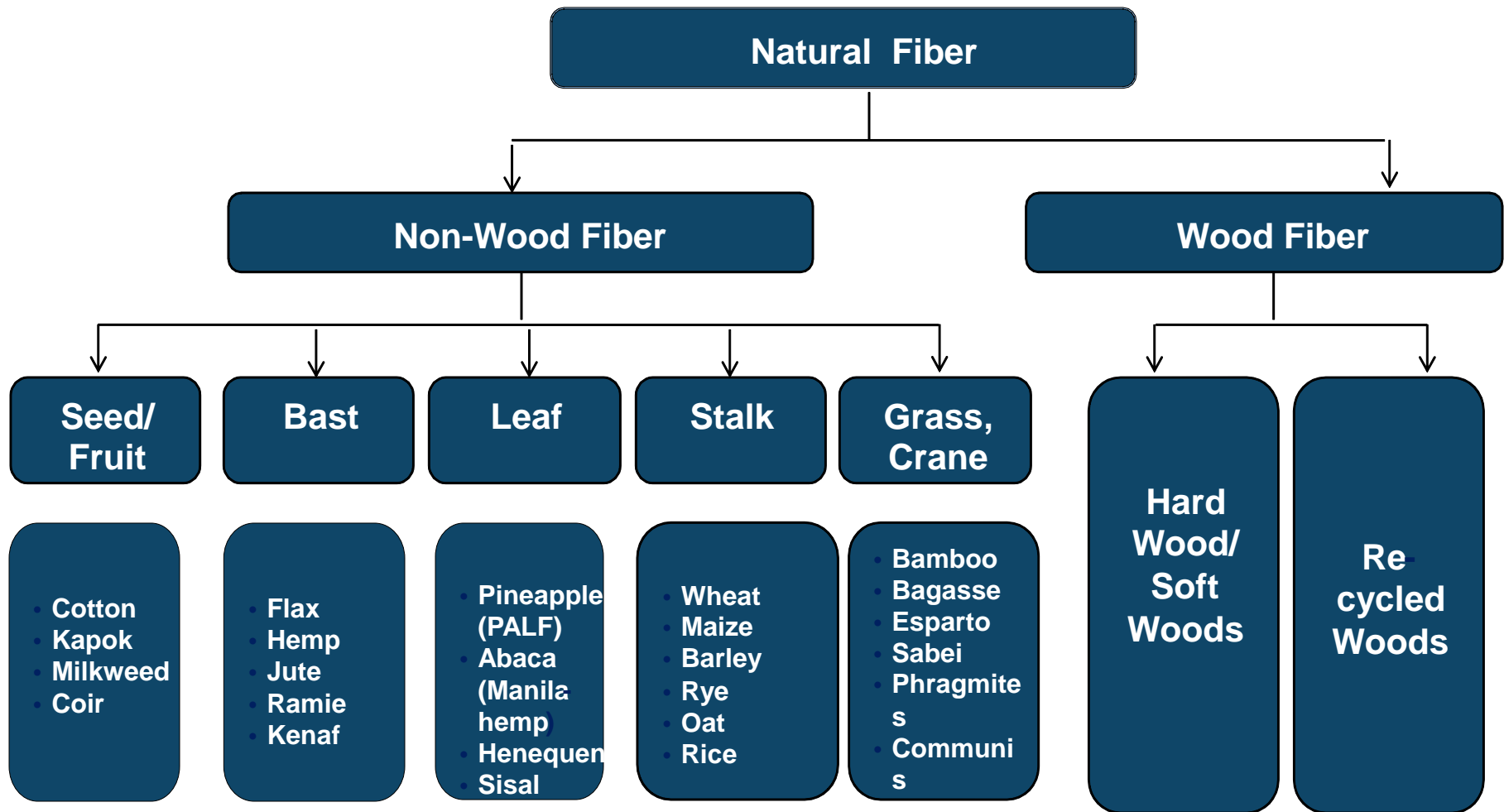
	Applications	Materials	Time Frame
	Clay/mud reinforced composites	Fuselage skins of spitfires	Prototype composite car by Henry Ford
	Body of "Trabant" car in Germany	Number of Automotive applications	E&E: Cases of cellular phones
	Sporting goods		
			
			
			
	Straw	Flax+ Phenolic	Hemp
			Cotton + Polyester
			Flax, Hemp, kenaf, Abaca
			Kenaf + PLA
			Flax, Hemp, kenaf
	In Egypt clay/mud reinforced by straw to build walls.	Shortage of Aluminum in England, led to use natural fiber	First production car built from Natural fiber composites
			
			
	3000 year ago	1939	1942
			1950-1990
			2000 onwards
			2004 onwards
			2006 onwards



Creating the Equation for Growth



# Reinforced Natural Fiber Classification: Vegetable fibers are used as reinforced material, divided into two segments wood and non wood fibers



# Natural Fiber Composite Applications and Technologies



## Automotive

Door panels  
Seat backs  
Headliners  
Dash boards  
Trunk liners

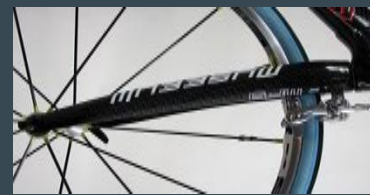
Compression  
Molding  
Injection  
Molding



## Electrical & Electronics

Mobile cases  
Laptop cases

Injection  
Molding



## Sporting Goods

Tennis Racket  
Bicycle  
Frames  
Snowboards

Oven Cure



## Construction

Door panels  
Decking  
Railing  
Window  
frames

Extrusion  
Compression  
Molding  
Injection  
Molding



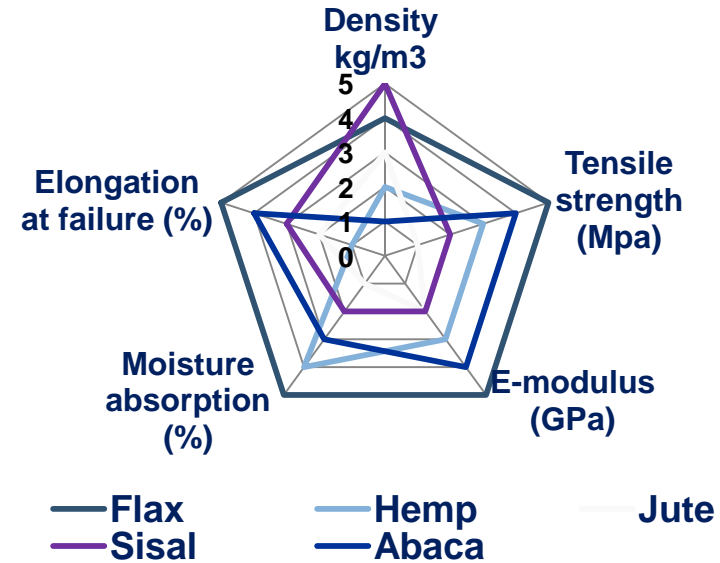
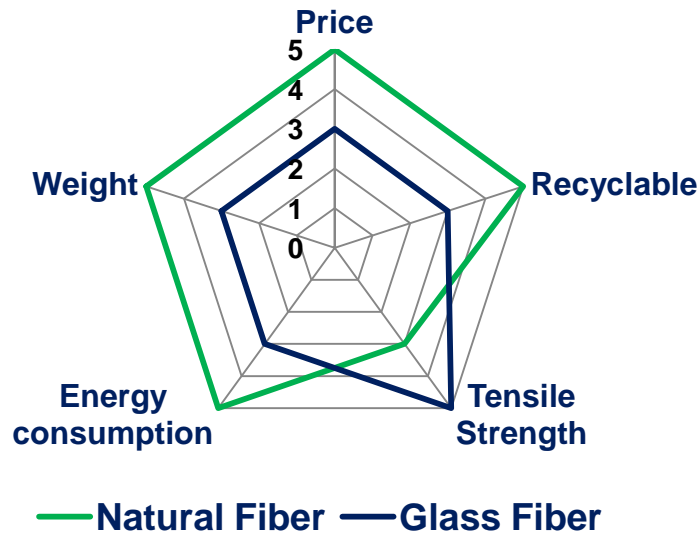
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# Competitive Analysis: Natural fiber composites v/s glass fiber composites



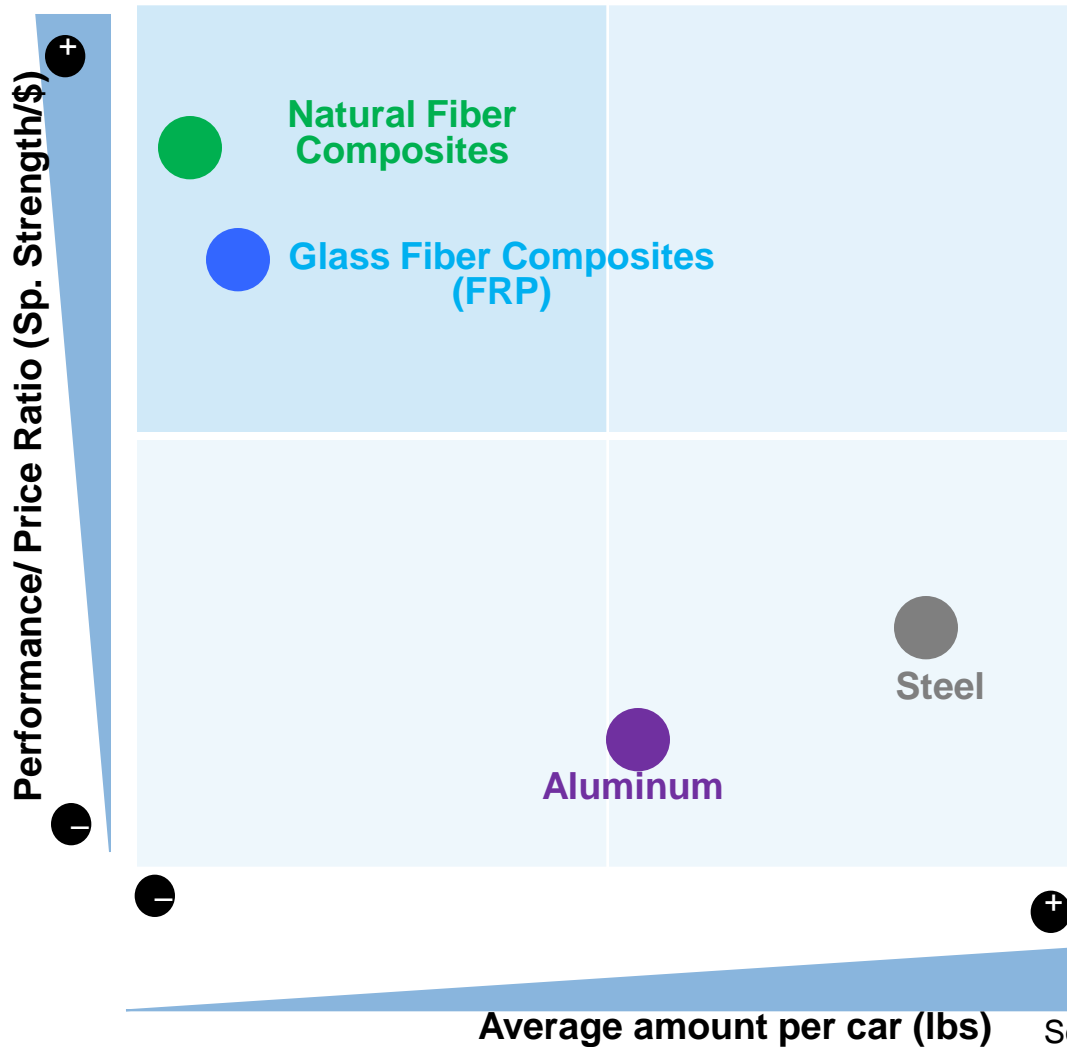
Source: Lucintel

- Natural fiber composites excel in most parameters except strength, strength of glass fiber composites is higher compared to natural fibers

- Flax fibers offer the highest reinforcing potential amongst the other natural fibers
- Flax offers higher tensile strength compared to others making it suitable for composite applications



# Performance Price Comparison of Competing Materials for Automotive Applications



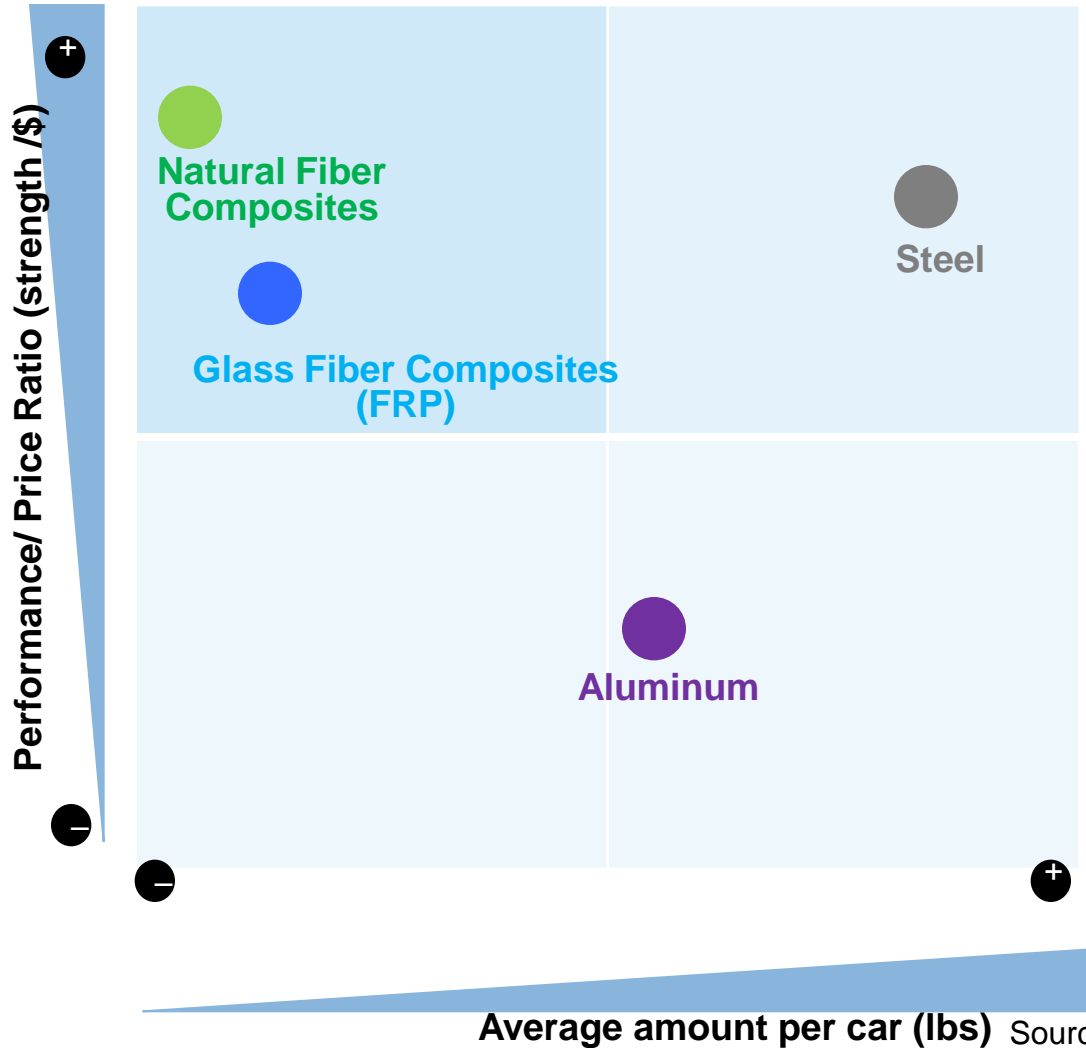
Materials	Average amount per car (lbs)	Performance /Price ratio (Specific strength/\$)
Steel	2000	0.15
Aluminum	600	0.08
FRP	77	0.36
Natural Fiber Comp.	35.2	1.15

Significant performance at lower prices of natural fiber composites, creating huge potential to replace competing materials in Automotive applications

Source: Lucintel



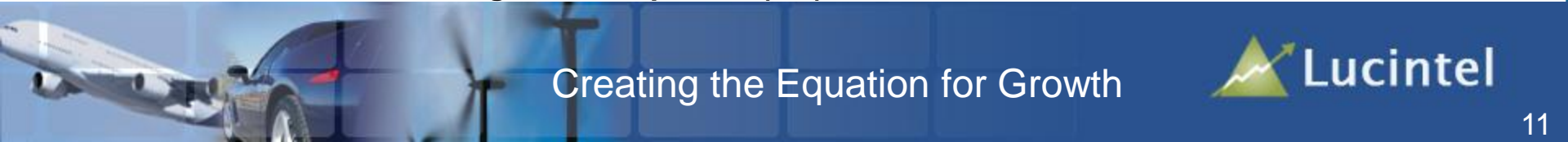
# Performance Price Comparison of Competing Materials for Automotive Applications



Materials	Average amount per car (lbs)	Performance /Price ratio (Strength/\$)
Steel	2000	1.1
Aluminum	600	0.2
FRP	77	0.7
Natural Fiber Comp.	35.2	1.5

Natural fiber composites has superior price performance optimization

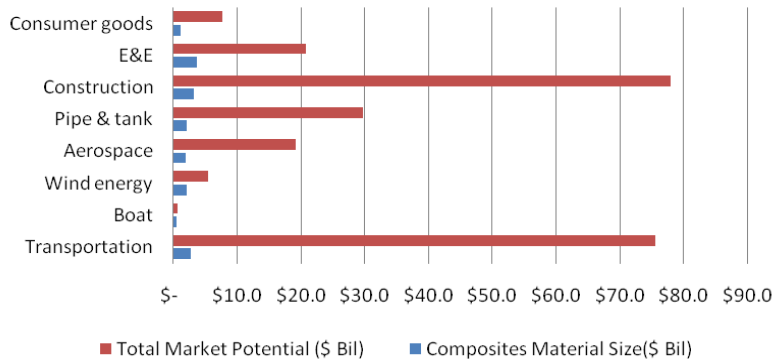
Average amount per car (lbs) Source: Lucintel



# Composites (fiber reinforced plastics– glass and carbon fiber based) Penetration in Various Market Segments: Natural fiber composites have significant potential in transportation and construction market

Market Segment	Composite Materials Market	Structural Materials Market (Steel, Al & Composites)	Composites Penetration	Performance Gap	Price Gap
Transportation	\$2.7 B	\$75.7 B	3.6%		
Marine	\$0.5 B	\$0.7 B	68%		
Aerospace	\$2.0 B	\$19.1 B	10%		
Pipe & tank	\$2.1 B	\$29.6 B	7%		
Construction	\$3.1 B	\$78 B	4%		
Wind Energy	\$2.0 B	\$5.4 B	38%		
Consumer Goods	\$1.1 B	\$7.7	14%		

Composites Penetration compared to Competing Materials (Steel & Al)



0% – 25% 25% – 50%

Source: Lucintel

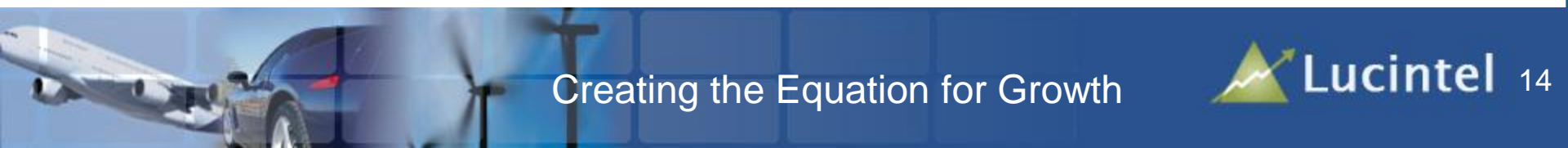
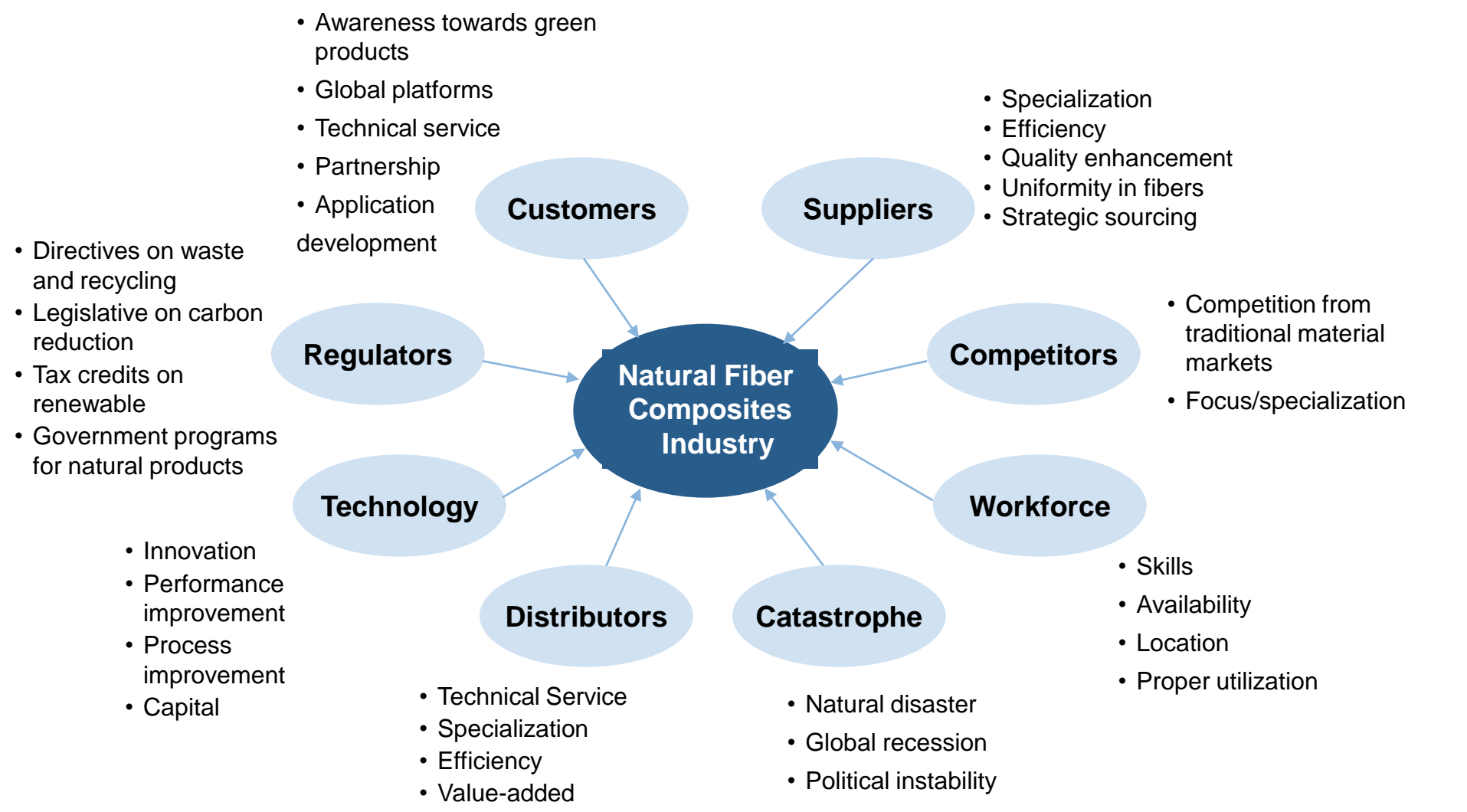


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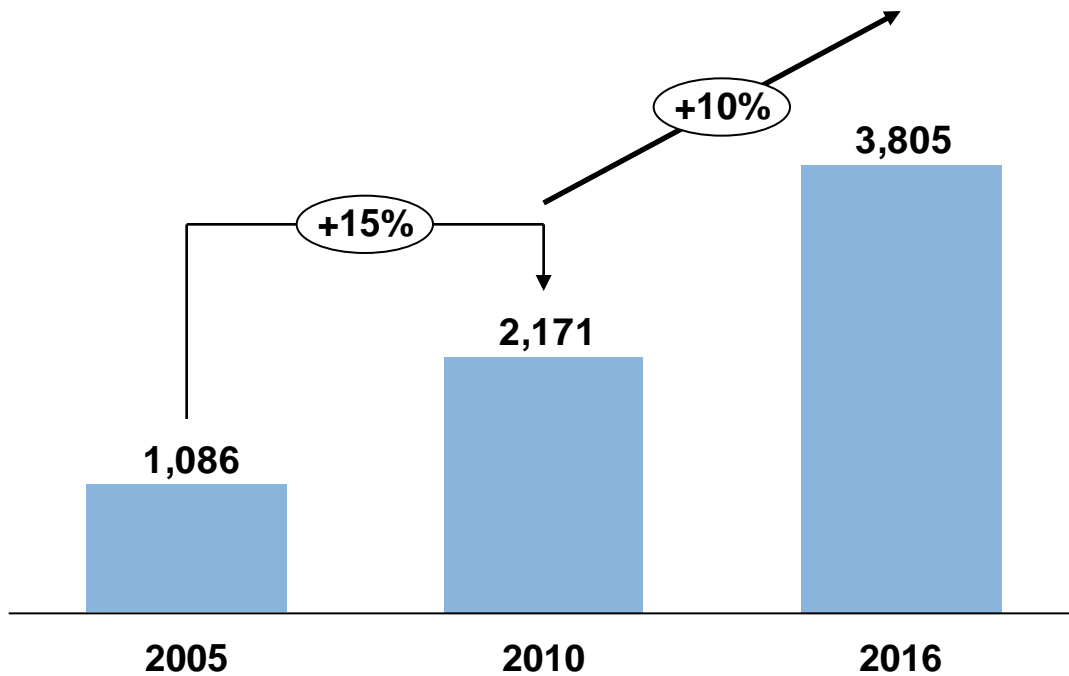


# External Forces Shaping the Natural Fiber Composites Industry: Future higher market fragmentation expected due to emerging economies. Companies in Developed nations with innovation capability can thrive and gain share.



# Natural Fiber Composites Trend and Forecast 2005 - 2016

## Natural Fiber Composites Trend & Forecast 2005 – 2016 (\$M)



### Notes:

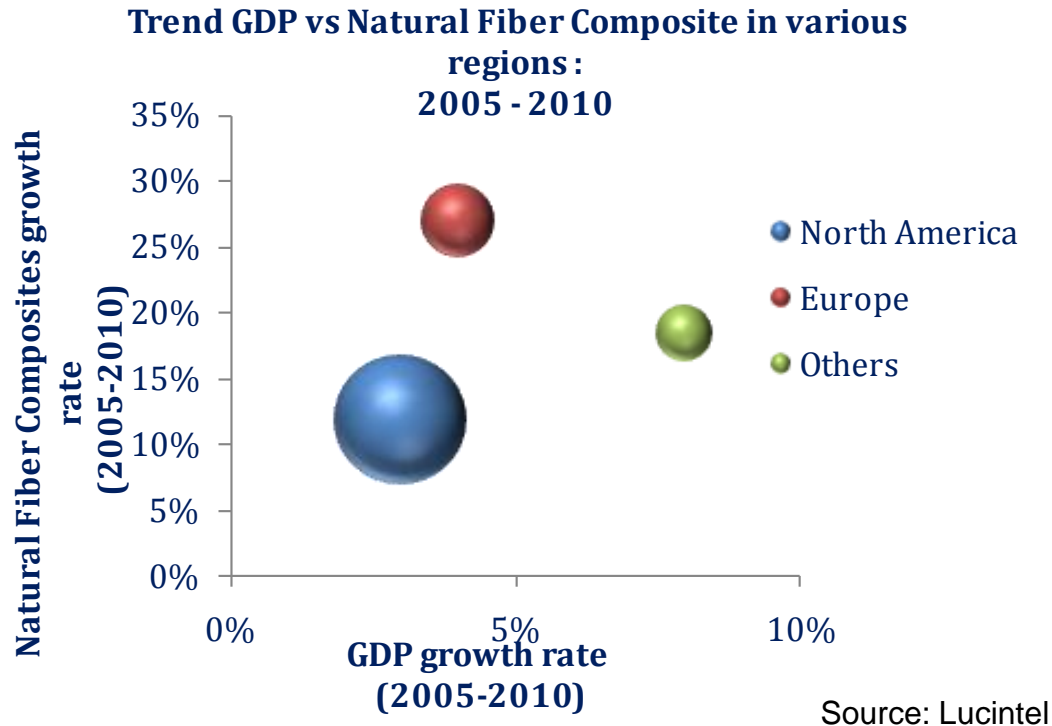
- Market includes wood and non wood natural fiber composites market

Source: Lucintel

## Key Insights

- Natural fiber composites has experienced healthy growth in last five years
- Natural fiber composites market is divided into two segment - wood fiber and non-wood fibers
  - Automotive is the largest segment for non-wood fibers, whereas construction is for wood fibers
- Europe is the largest region for Automotive applications and North America is the largest region for Building & Construction applications
- Natural fiber composites are new materials for E&E and Sporting goods applications
- Environmental concerns are making natural fiber composites suitable in various new applications

# Trend in GDP in Various Regions : 2005 - 2010



## Notes:

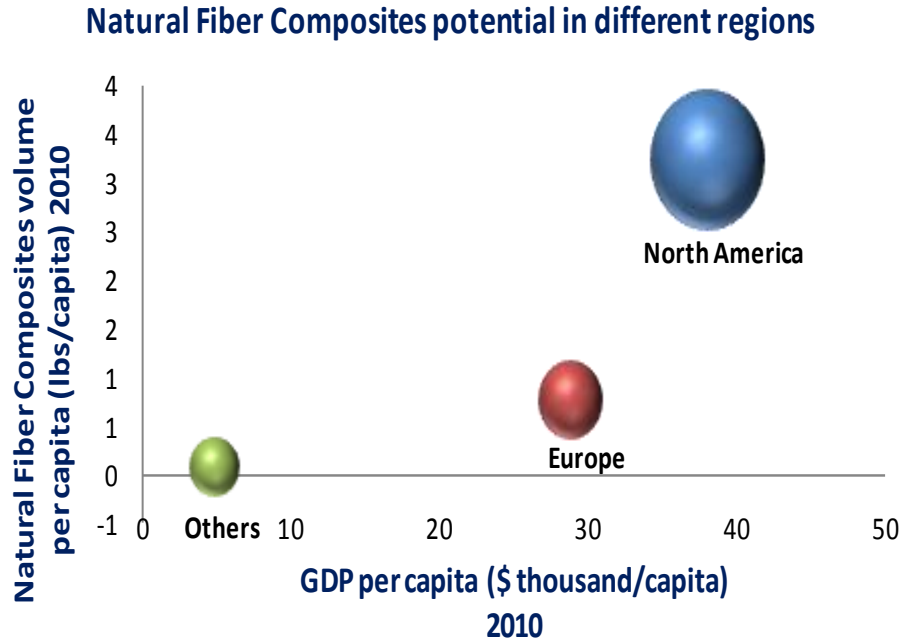
- Others includes Asia and rest of the world
- Bubble size represents market size 2010 (\$ M)

- Natural fiber composites has observed positive growth in each region, and surpassed GDP growth
- Natural Fiber Composites industry performed well compare to GDP during last 5 years, and it is expected to continue to grow at a higher rate than GDP over the next 5 years.





# Natural Fiber Composites Potential in Different Regions



Source: Lucintel

## Notes:

- Others includes Asia and rest of the world
- Bubble size represents market size 2010 (\$ M)

## Market Leader:

- North America is the leader in the natural fiber composites consumption followed by the European region

## Potential Market:

- European region is potential region due to increasing awareness and acceptance of natural fiber composites by automotive players
- Asian region have significant potential for growth of composites as composites per capita is significantly lower than developed nations

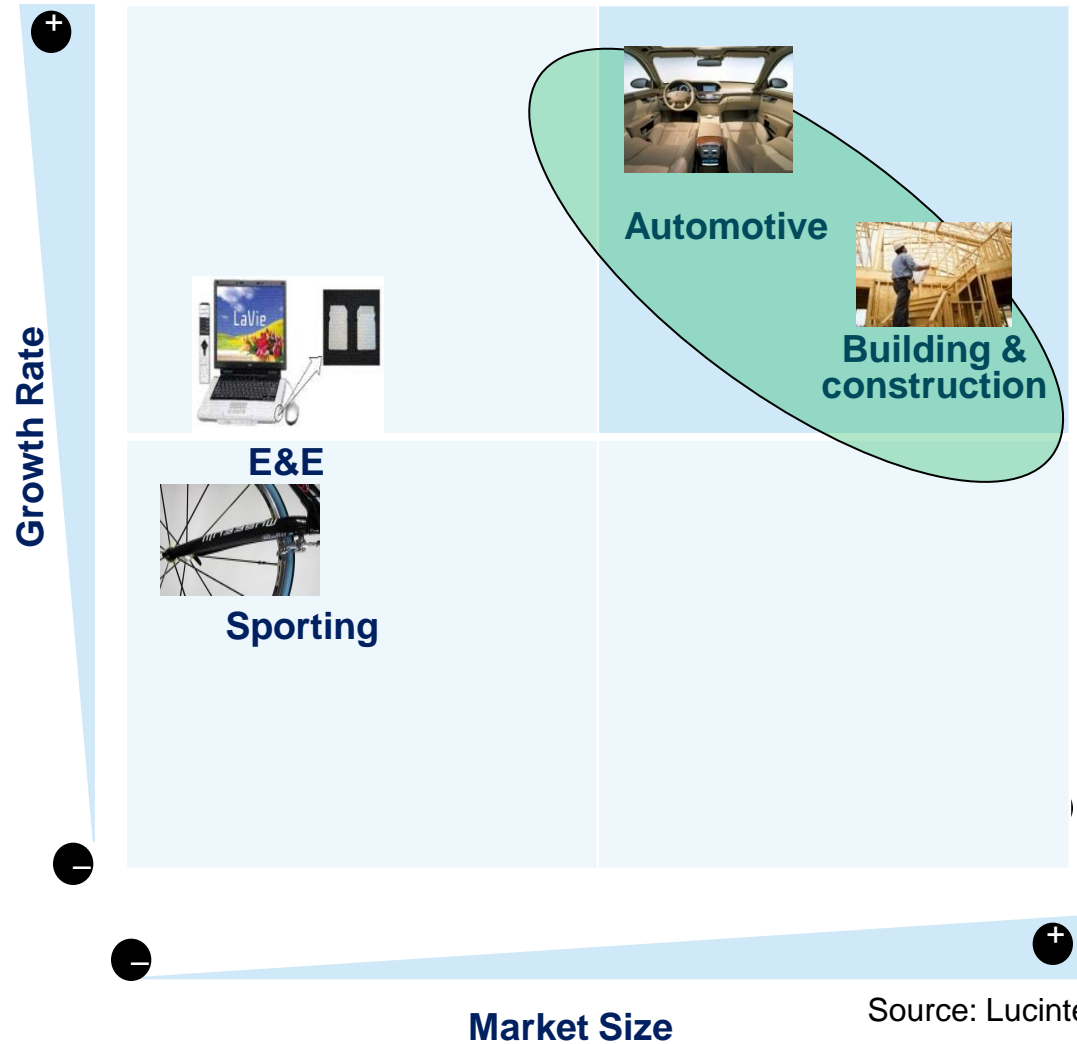


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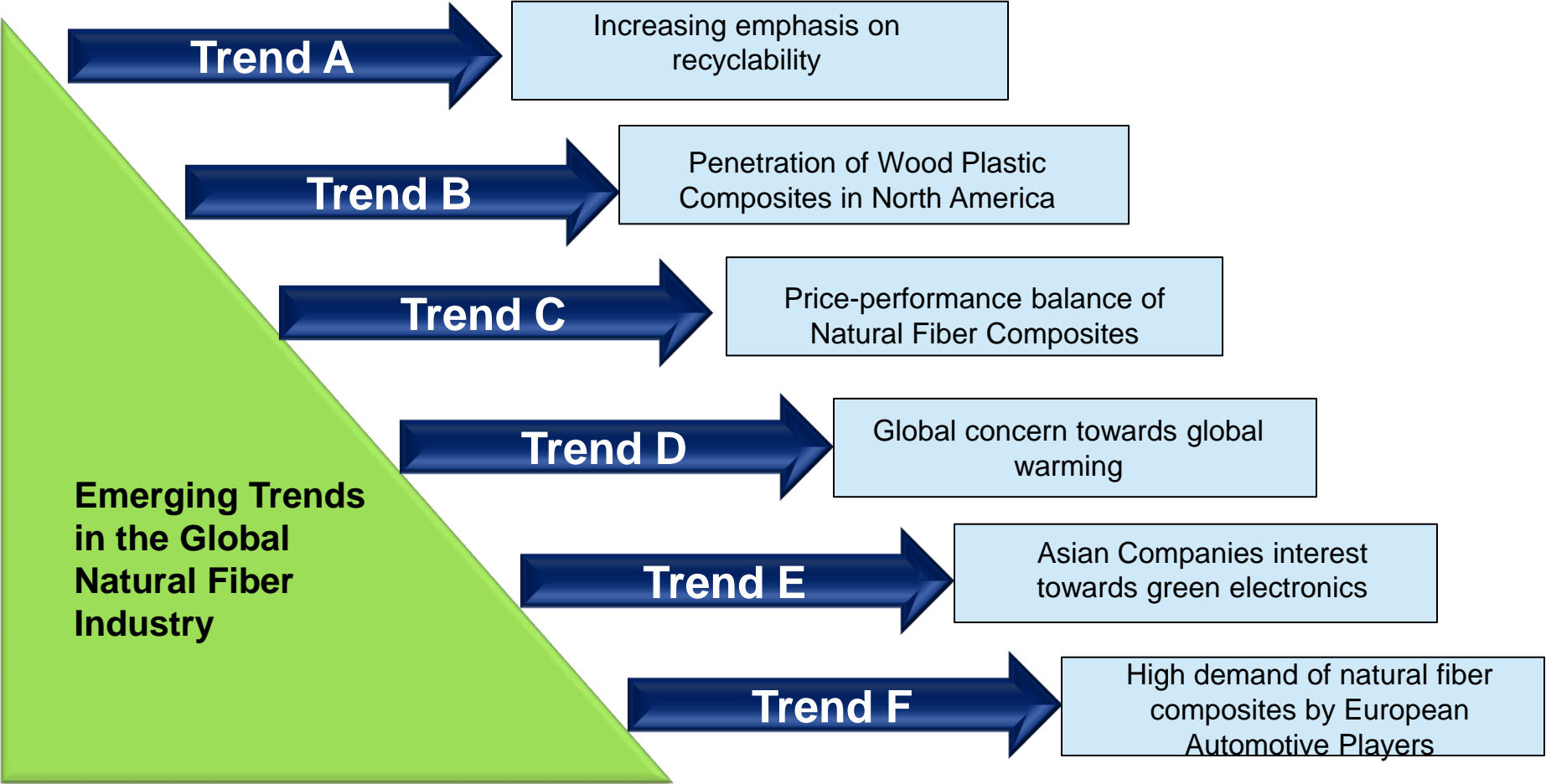
# Growth Opportunities of Natural Fiber Composites in various Applications



## Key Insights

- Demand for natural fiber composites is expected to be high in automotive and construction applications due to
  - Awareness towards green product and increasing acceptability
  - Need of light weighted cost effective products
  - Reduce global warming effect
  - Governmental supports
- As natural fiber composites are new in E& E and sporting segments, but it has healthy potential to capture a good market in near future

# Emerging Trends in the Global Natural Fiber Industry



# Innovations in Natural Fiber Composites Market



## Eco Mobile by NEC 2006:

- First time in world an environmentally sound material has been used for a mobile phone casing

### Model Name:

- “FOMA(R) N701iECO”

### Material used:

- Reinforcement: Kenaf
- Resin: Poly Lactic acid

### Advantages

- Heat resistant
- Environment friendly



## Innovations in Automotive:

### 1.OEM & Model Name:

- Ford Motor Co., 2010 FordFlex CUV

### Applications:

- Trim bin

### Material & Process:

- Wheat-Straw-Reinforced PP, Injection molding

### 2. OEM & Model Name:

- BMW 2008MY BMW 7 Series Luxury Sedan

### Applications:

- Door Panel

### Material & Process:

- Prepreg of Natural fiber with acrylic polymer, Compression molding

### 3.Process Innovation

- Highly automated D-LFT process by Damlier Chrysler



## Racing Bicycle with NFC:

- Museeuw Bikes has developed first racing bike with flax carbon epoxy prepreg

### Model Name:

- MF1, MF3, MF5

### Material used:

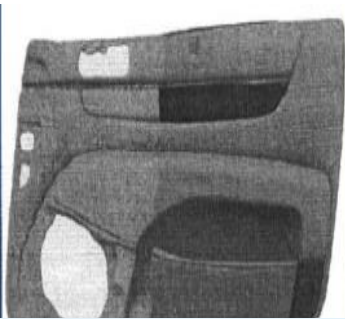
- Reinforcement: Flax, Hemp
- Resin: Epoxy

### Advantages

- Good anti-vibration property
- low cost



# Emerging Natural Fiber Composite Applications in Automotive



Applications	Fiber	Size of Opportunity	Key Drivers
Door panel/inserts	Kenaf/ Hemp Wood fiber	Medium	<ul style="list-style-type: none"> <li>• Lighter weight</li> <li>• Lower cost</li> <li>• Eco friendly</li> <li>• Governmental support</li> <li>• Friendly processing</li> <li>• Thermal recycling is possible</li> <li>• Good thermal and acoustic insulating properties</li> </ul>
Rear parcel shelves	Kenaf Flax	Medium	
Seatbacks	Flax	Medium	
Spare tyre covers	Flax	Medium	
Other interior trim	Kenaf Flax	Small	
Spare-wheel pan	Abaca	Medium	



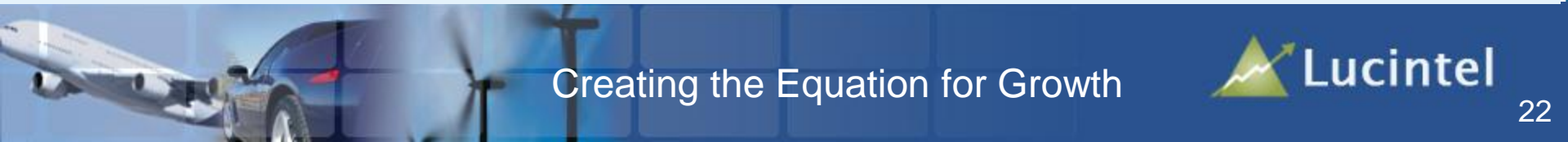
**Interior Door Panel**





**Door Inserts**

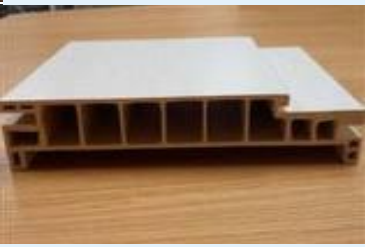


**Interior Panels**



# Emerging Natural Fiber Composite Applications in Construction

	Applications	Fiber	Size of Opportunity	Key Drivers
 <p><b>Decking</b></p>	Decking	Wood, Flax, Rice husk, Bagasse	High	<ul style="list-style-type: none"> <li>• Lower life cycle cost</li> <li>• Low &amp; easy maintenance</li> <li>• Low moisture absorption</li> <li>• Lower variability than wood</li> <li>• Eco friendly</li> <li>• Governmental regulations</li> </ul>
	Railing Systems	Wood, Flax, Rice husk, Bagasse	High	
 <p><b>Railing</b></p>	Window frame	Wood, Flax, Rice husk, Bagasse	High	
	Fencing	Wood, Flax, Rice husk, Bagasse	Medium	
	Panels	Wood, Flax, Rice husk, Bagasse, coir, stalk	High	

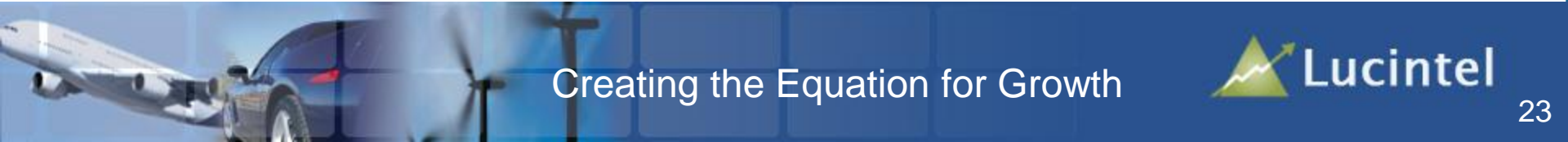


**Window frame**

**Panels**

**Fencing**

**Door frame**



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# Emerging Natural Fiber Composites in Other Applications



Applications	Fiber	Size of Opportunity	Key Drivers
Tennis Racket	Flax	Medium	<ul style="list-style-type: none"> <li>• Good anti vibration</li> <li>• Lower cost</li> <li>• Eco friendly</li> </ul>
Bicycle Frame, Fork, Seat Post	Flax	Medium	
Laptop Cases	Hemp	Small	
Mobile Cases	Kenaf	Medium	
Laptop Cases	Flax	Medium	
Musical Cases			



**Musical Cases**



**Bicycle with NFC frame**



**Tennis Racket**



**Snowboard**





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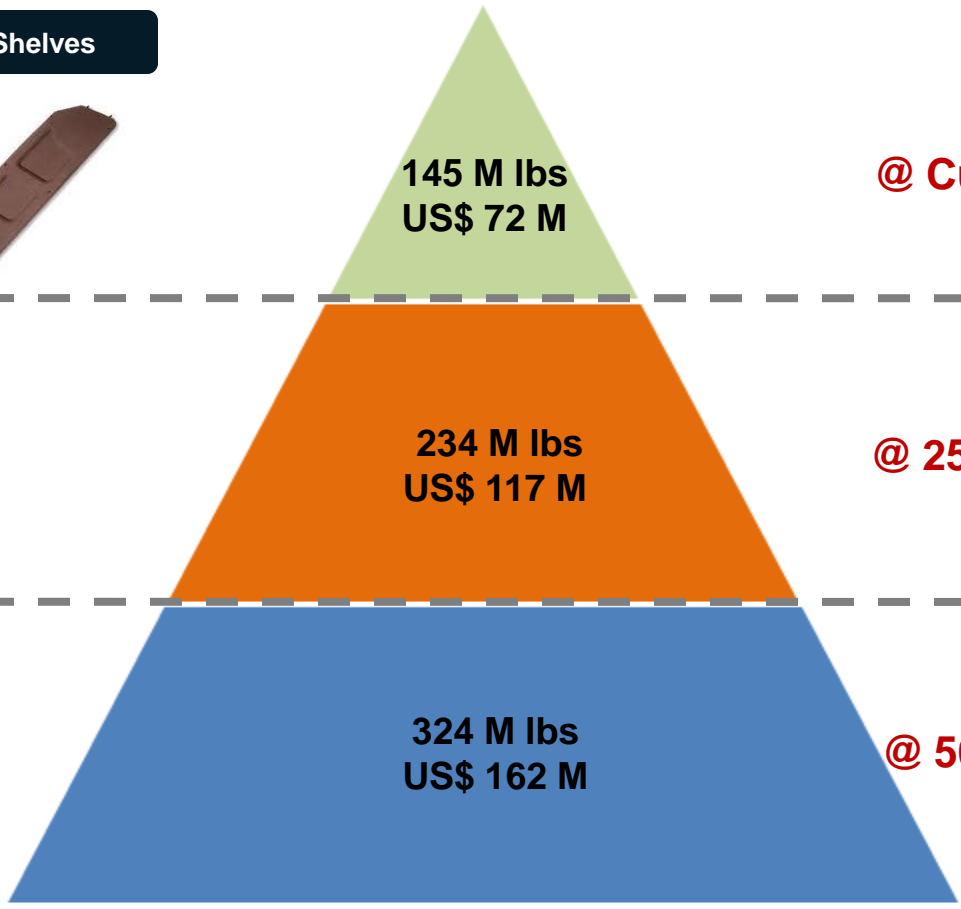


# Natural Fiber Composites Market Potential Analysis in Automotive in 2015

## Applications

NFC Potential in 2015

NFC Potential Strength Improvement



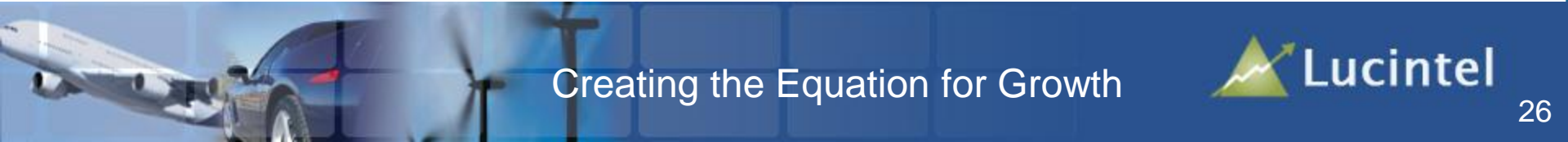
@ Current Strength

@ 25% Improvement

@ 50% Improvement

Source: Lucintel

Methodology: Sensitivity analysis between consumption volume & strength performance of natural fiber



# Conclusions

- **New business models need to be re-invented to address the fast changing complex world**
- **Higher specific properties with lower prices of natural fiber composites are making it attractive for various applications**
- **Good anti-vibration properties & low cost are key drivers for higher adoption of natural fiber composites in sporting goods segment**
- **Due to lower life cycle cost & easy maintenance of wood plastic composites, it is gaining more acceptance in building & construction applications**
- **Eco-friendly measures taken by electronic companies are the major growth drivers for natural fiber composites in Electrical & Electronics applications**
- **Rising prices of petroleum based products, strong government support to eco-friendly products, higher acceptance and positive growth of end use industries will drive natural fiber composites growth to new horizon**
- **Performance improvement of natural fibers will help to cater more applications and industries in near future**



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## About Lucintel

- Lucintel is the leading global management consulting & market research firm.
- Lucintel creates your equation for growth and is committed to actionable results that deliver significant value and long term growth to our clients.
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**Recreational**



**Composite Materials**

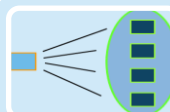
## Consulting



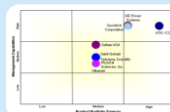
**Growth and Strategic Consulting**



**Benchmarking**



**Opportunity Screening**



**Partner Search and Evaluation**



**Due Diligence and M&A**



**Market Entry Strategy**

# Lucintel has an extensive toolkit to address key strategic questions for increasing your company's profitability and market presence



## Key Questions

- **Is market space / opportunity of current product offerings sufficiently robust?**
- **Markets are focus for many: how can my company profitably differentiate?**
- **Based on our core skills, where should we focus?**
- **Should we build or buy? Is build even an option?**
- **What game changer actions exist and/or is a more incremental approach best?**
- **What is the order sequence of market entry segments / products?**



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## Reach Lucintel

For your business requirements and cutting edge consulting solutions, contact Lucintel at [helpdesk@Lucintel.com](mailto:helpdesk@Lucintel.com) or Tel. +1-972-636-5056 or call one of the following.

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