



Creating the Equation for Growth

Growth Opportunities in Global Composites Industry

Lucintel Brief

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Lucintel

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Executive Summary

- **Global composite materials industry reached \$17.7B in 2010, YOY growth of 10.3%**
 - **Major industries rebounded after 2009 slowdown from economic crises**
- **End product market made with composites in 2010 was \$50.2B**
- **North American composites industry accelerated by ~13% in 2010, Europe accelerated by ~8% while Asia grew by ~9% in 2010**
 - **Driven by Government economic stimulus package and increased consumer confidence**
- **By 2016, composite materials industry expected to reach \$ 27.4B (7.5% CAGR) while end product market made with composite materials expected to reach \$78B**
- **Future market for composites expected to be more fragmented and international due to emerging economies**
- **Population growth, new infrastructural projects, urbanization, increase in middle class population and green movement will drive composites growth to new horizons**
- **Companies with innovation capability will sustain and gain market share in future**

















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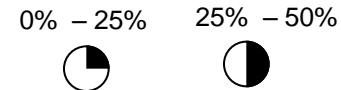
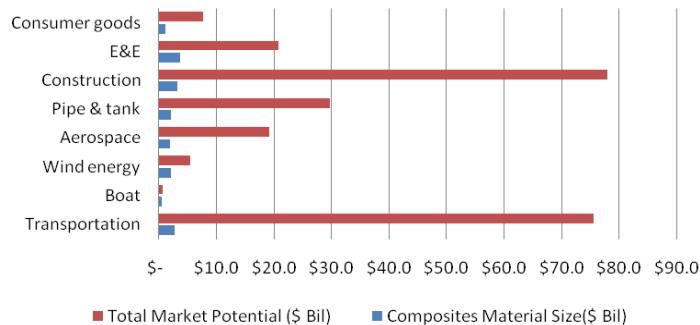
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Composites Penetration in Various Market Segments

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)

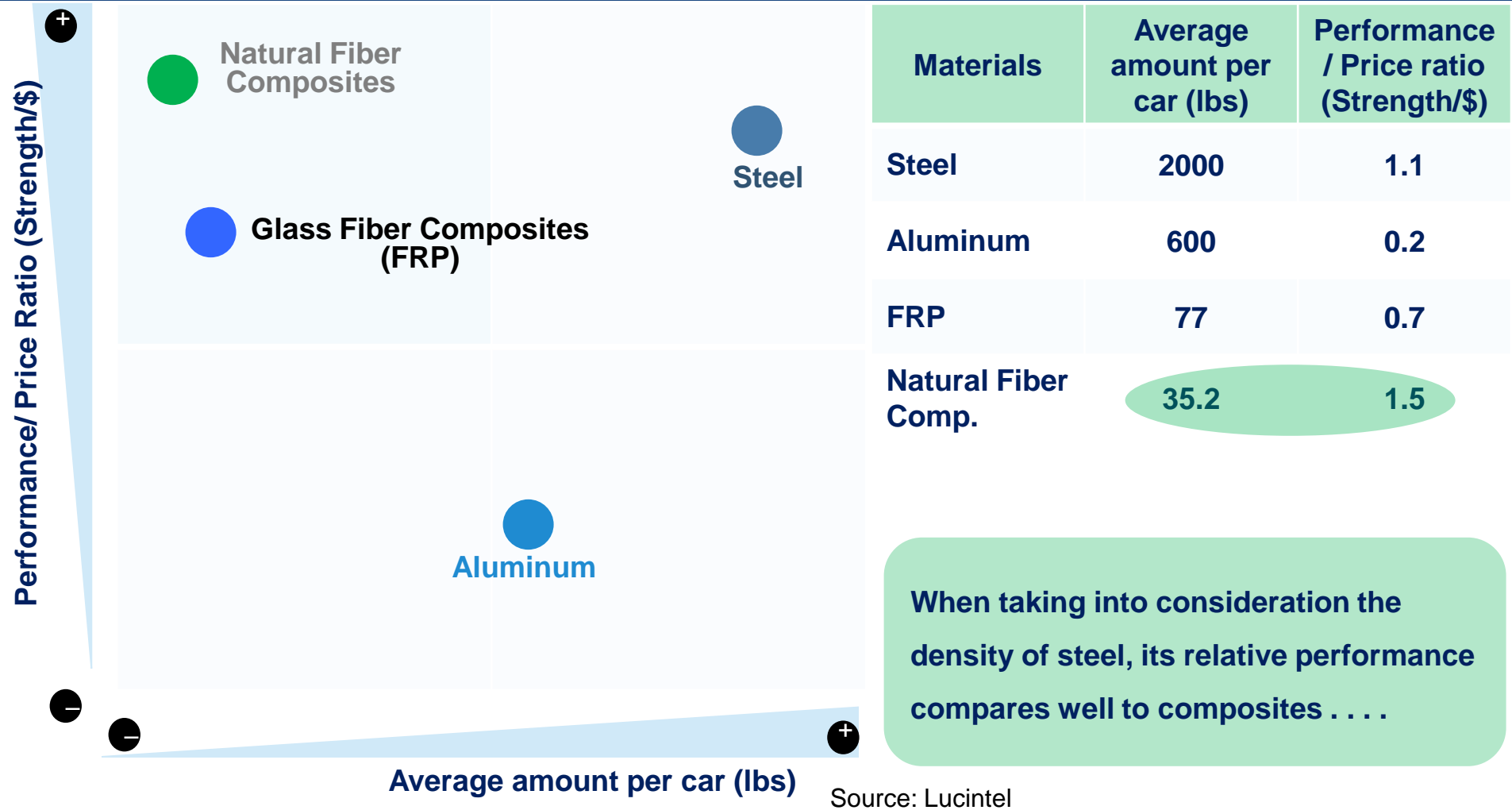


Source: Lucintel

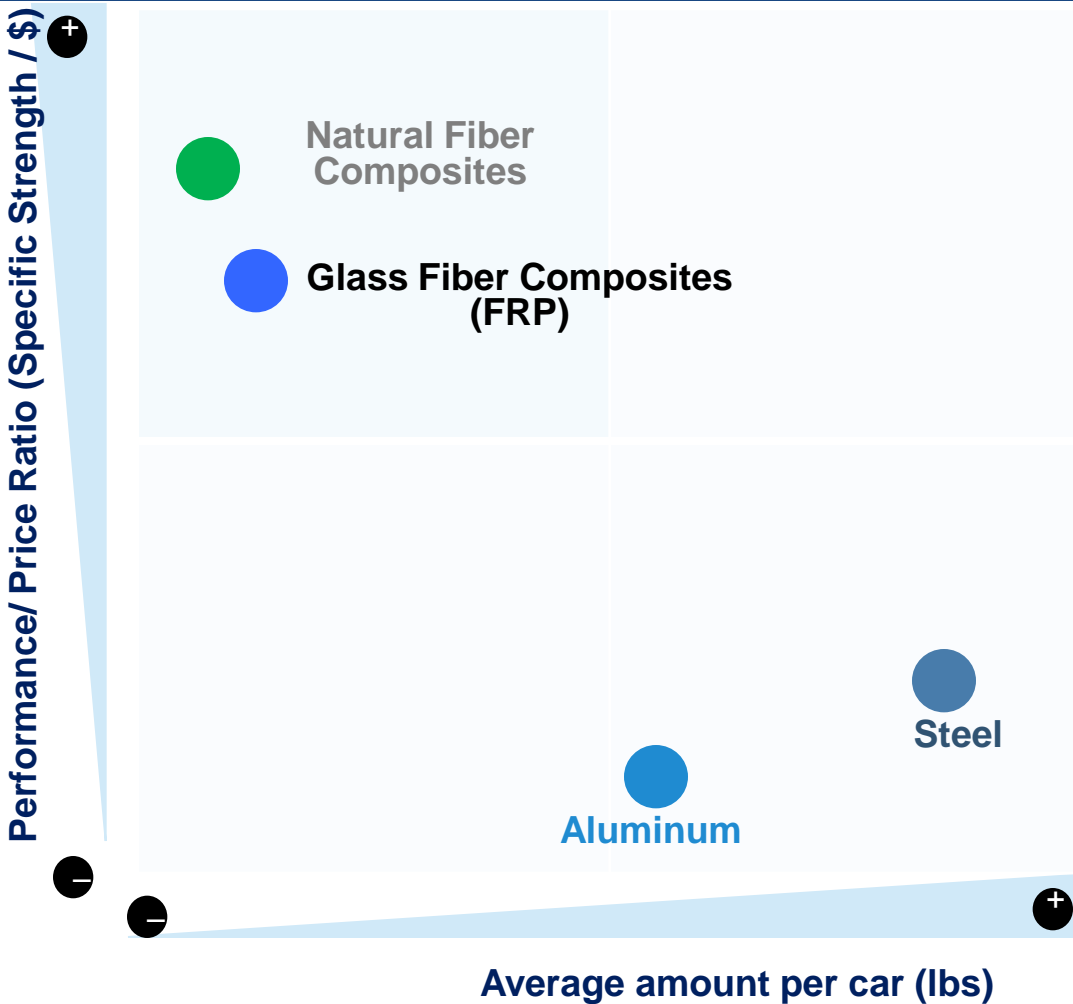


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Price Performance Comparison of Competing Materials for Automotive Applications



Price Performance 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

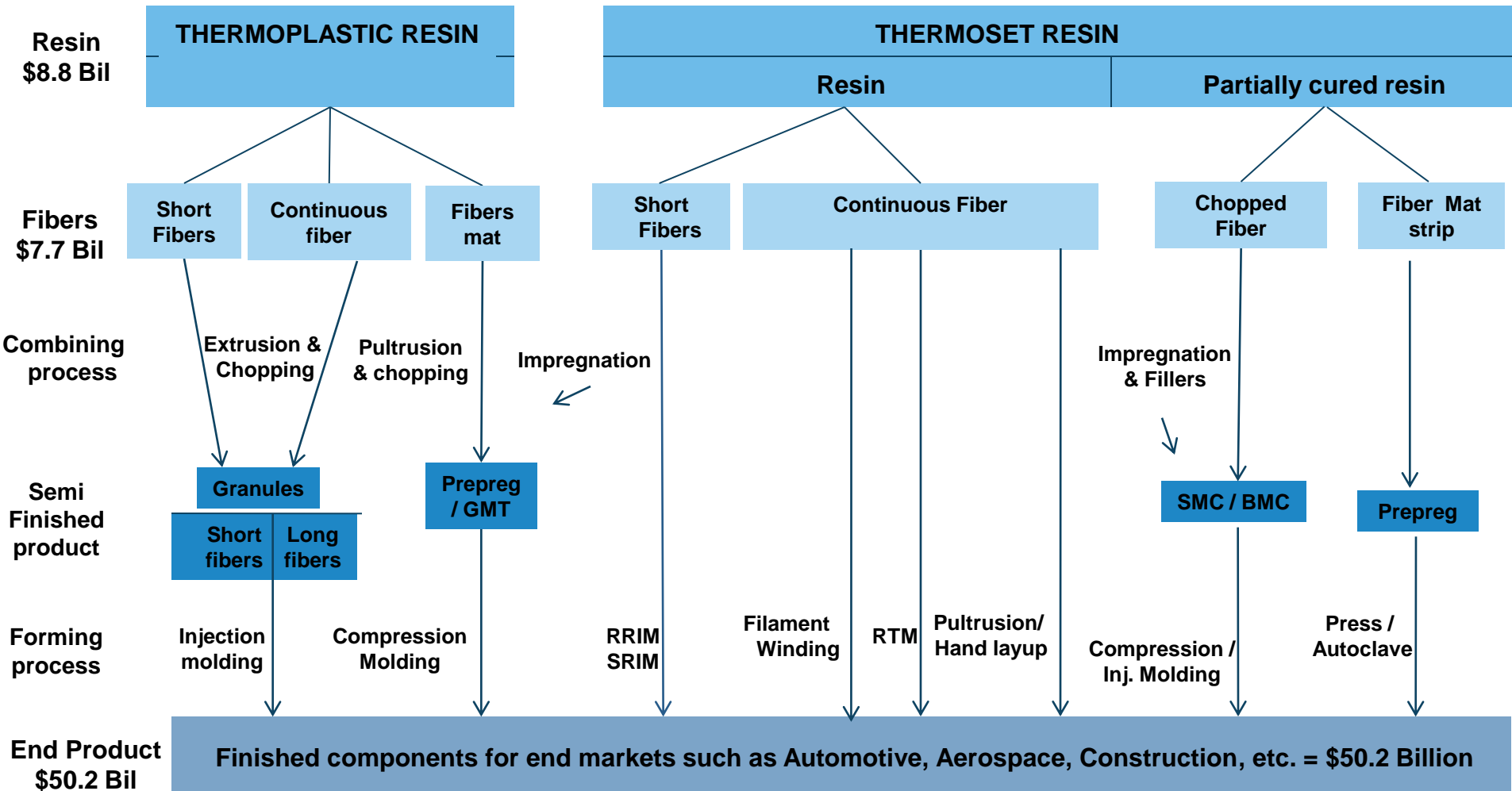
For equal volumes, composites outperforms steel and aluminum. Natural fiber composites has additional strong penetration potential

Source: Lucintel



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Thermoset and Thermoplastic Composites Market in 2010



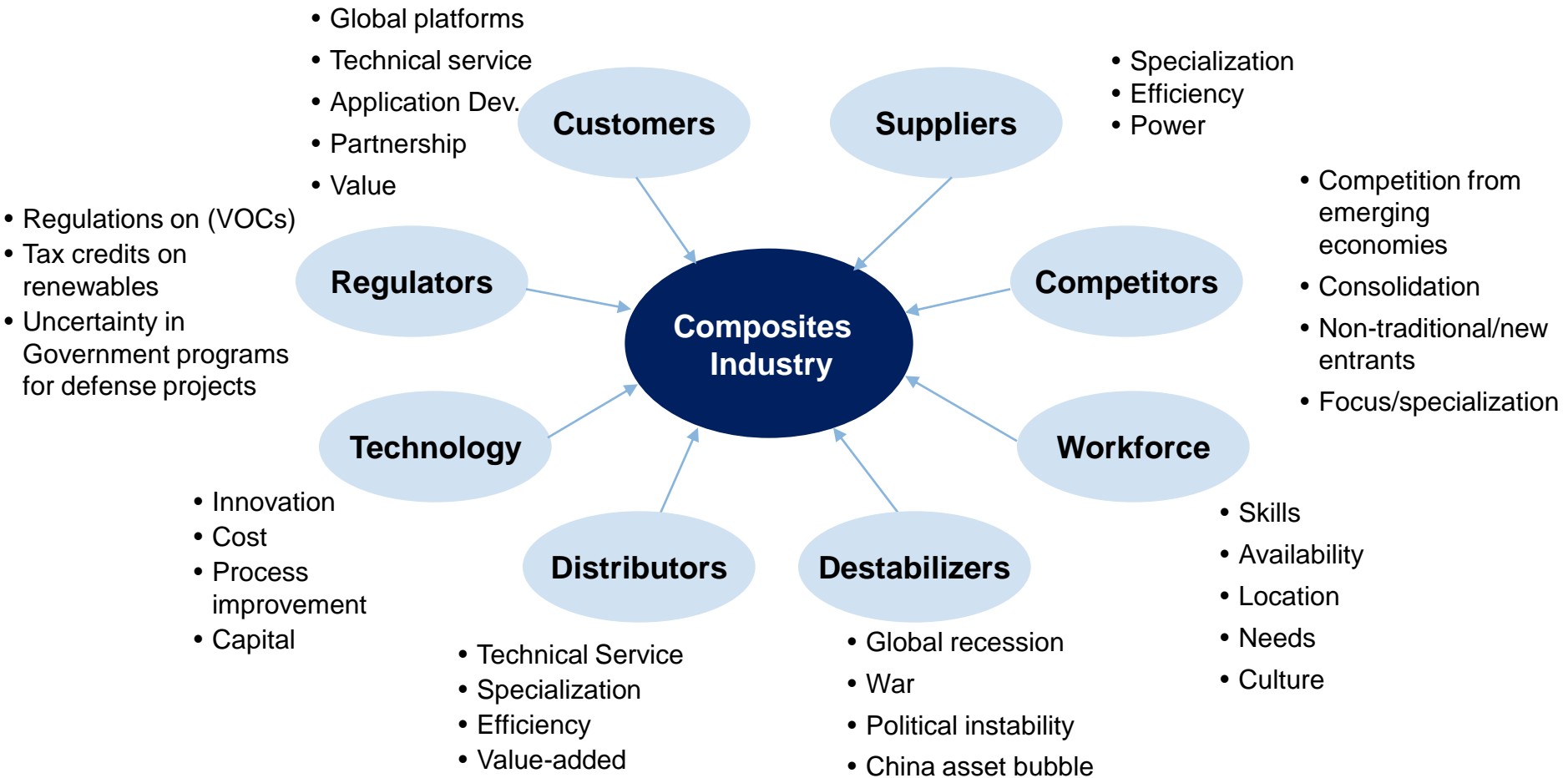
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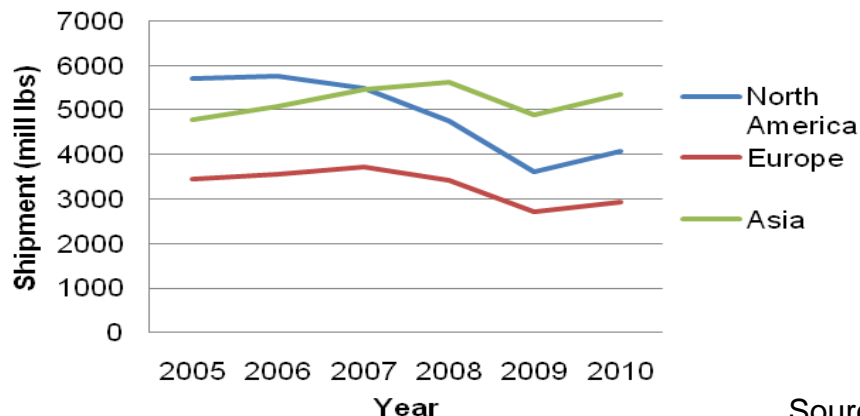


External Forces Shaping Composites Industry: Future higher market fragmentation expected due to emerging economies. Companies in Developed nations with innovation capability can thrive and gain share



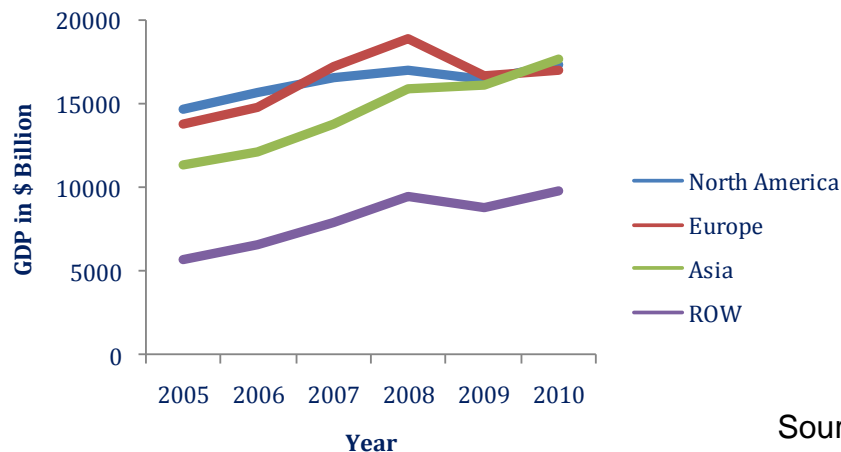
Regional Composites Market Trend: 2005-2010

Trend (2005-2010) in composites shipment in various regions



Source: Lucintel

Trend (2005 - 2010) in GDP in various regions



Source: Lucintel

Key Insights

- Composites industry growth outpaced GDP in 2010
- Huge fluctuations in various markets during last 5 years due to economic recession
- Composites industry performed poorly relative to GDP during last 5 years
- However forecasted to continue to grow at a higher rate than GDP over next 5 years

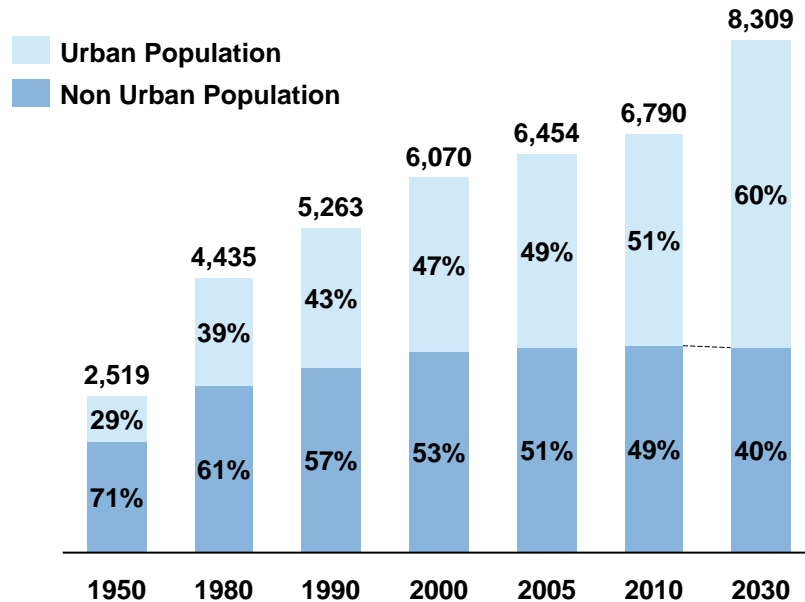


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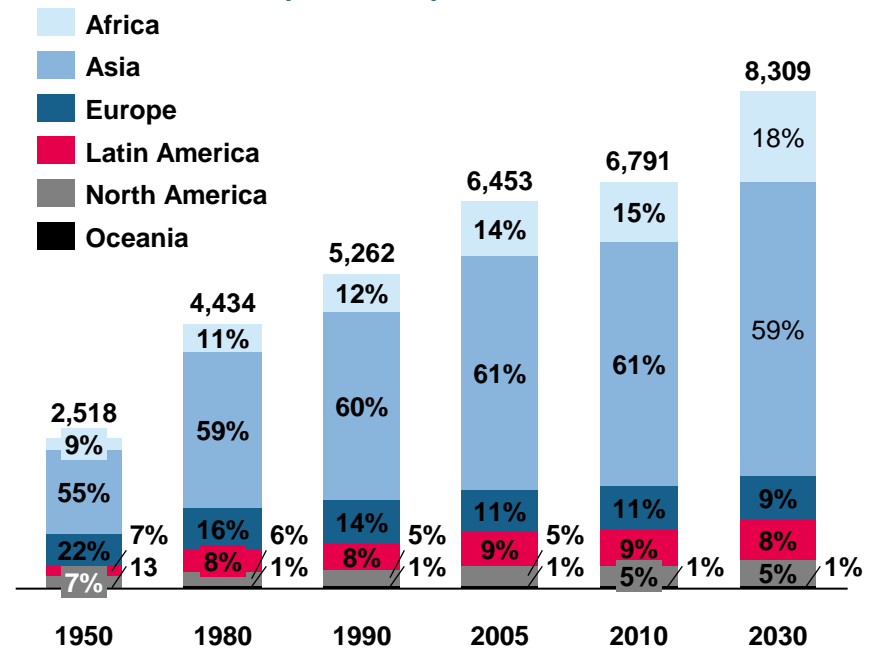


Looking towards the future: The World has become an Urban World with strong growth opportunities across developing nations . . .

Global Urban & Non Urban Population (Millions)



Global Population by Region (Millions)



World Population in Millions

Area	1950	1980	1990	2000	2005	2010	2030
World	2,519	4,435	5,263	6,070	6,454	6,790	8,309
Urban	731	1,734	2,263	2,835	3,143	3,449	4,985
Non Urban	1,788	2,701	3,000	3,235	3,311	3,341	3,324

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...where the largest urban cities are in developing countries

Rank	Largest Urban Areas 1900	Largest Urban Areas 1950	Largest Urban Areas 2000	Largest Urban Areas 2025
1	London, UK	New York US	Tokyo- Yokohama, Japan	Tokyo- Yokohama, Japan
2	New York, US	London, UK	Mexico City, Mexico	Mumbai, India
3	Paris, France	Tokyo, Japan	New York, United States	Delhi, India
4	Berlin, Germany	Paris, France	São Paulo, Brazil	Dhaka, Bangladesh
5	Chicago, US	Shanghai, China	Mumbai, India	São Paulo, Brazil
6	Vienna, Austria	Moscow, Russia	Shanghai, People's Republic of China	Mexico City, Mexico
7	Tokyo, Japan	Buenos Aires, Argentina	Kolkata, India	New York, United States
8	St. Petersburg, Russia	Chicago, US	Seoul-Incheon, South Korea	Kolkata, India
9	Manchester, UK	Ruhr, Germany	Buenos Aires, Argentina	Shanghai, People's Republic of China
10	Philadelphia, US	Kolkata, India	Los Angeles-Long Beach-Santa Ana, USA	Karachi, Pakistan

Source: Demographic World Urban Areas Population & projections 2010, United Nations, World Urbanization Prospects, The 2007 Revision.

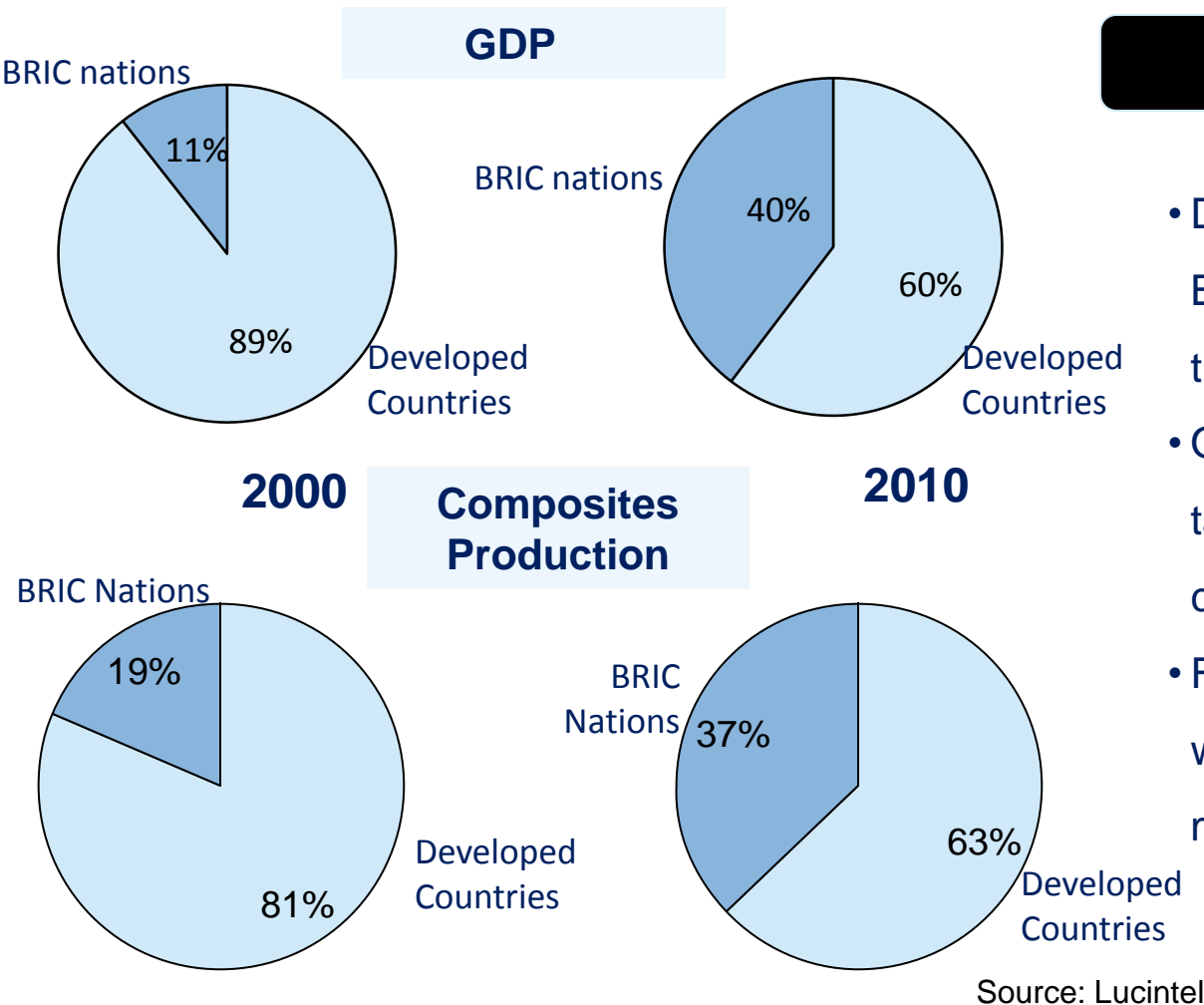
Emerging Nations

Other Regions

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As Developing Countries Play a Larger Role in the Global Economy, their presence in composites manufacturing is also increasing

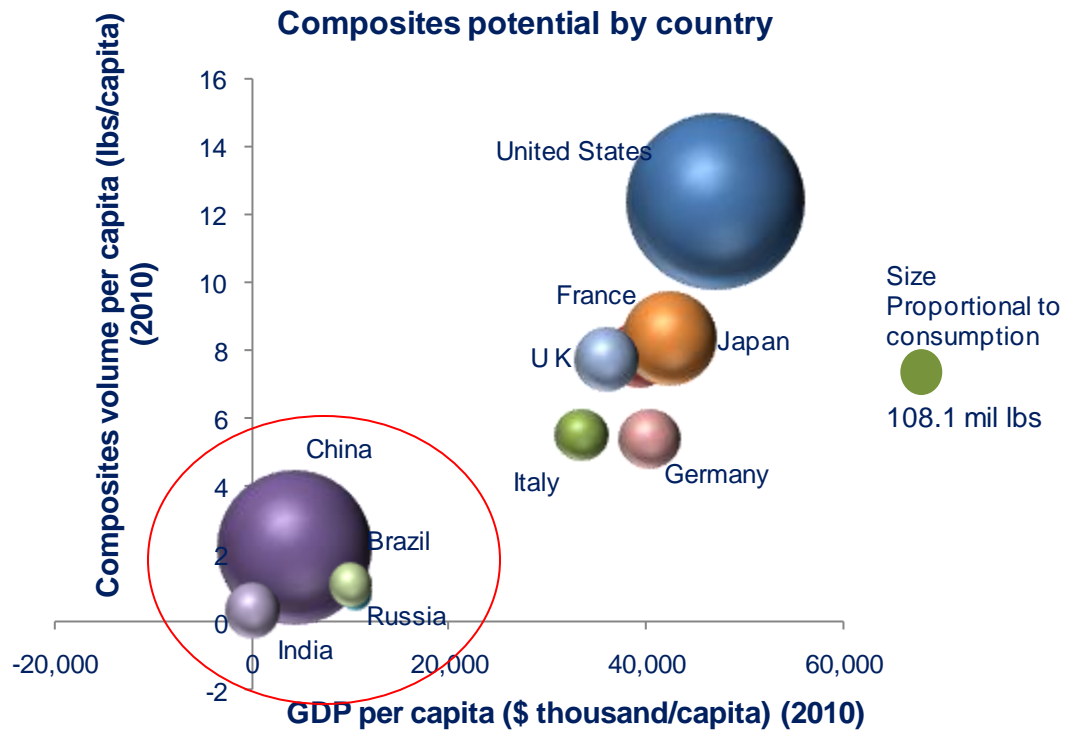


Key Insights

- Developing nations (defined as BRIC) have substantially increased their participation in global economy
- Overall, Developing nations have taken a stronger role in global composites production
- Further BRIC increases are not whether they will happen, but by how much?



Composites potential in different countries (2010)



Source: Lucintel

BRIC Mega Trends

Rapid Growth

Rapid Urbanization

Emerging Middle Class

Global Connectivity

Increased OEM Production

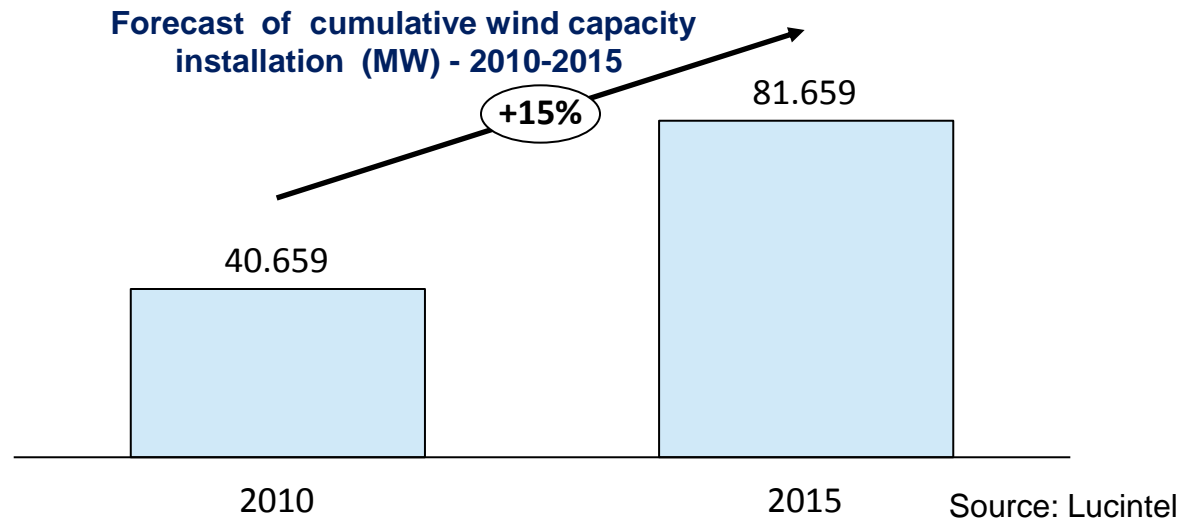
Potential Challenges

Rising Costs

Asset Bubbles / Loose Credit

Political Instability

US wind market Fell in 2010 with future recovery in the works



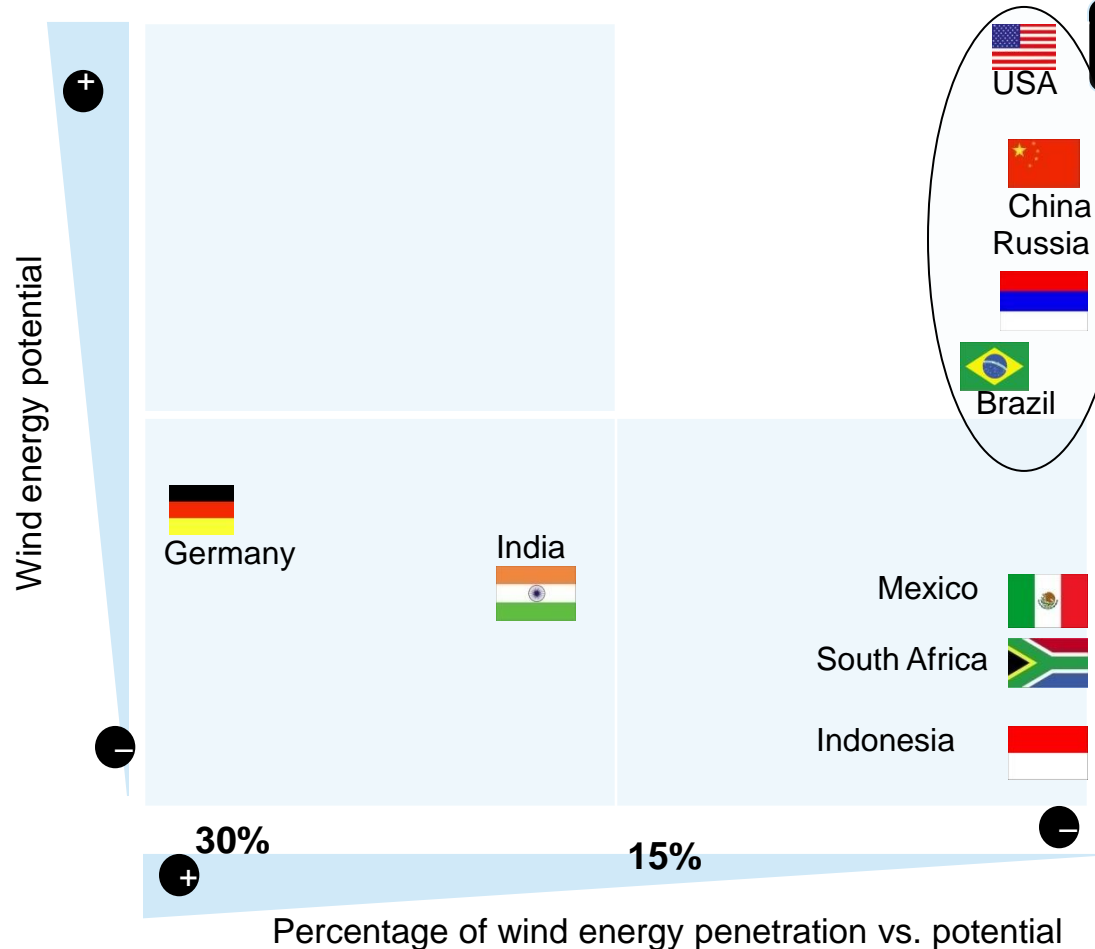
Challenges as overall wind market expected to decline in 2010

- 3-4% drop in energy demand has a multiplier effect on new capacity projects which are 50% renewable
- Fall of natural gas prices affecting wind competitiveness
- Connectivity issues impacting new projects
- Lack of robust long term federal targets for renewable energy continues to impact investor confidence and credit availability
 - State level RPS targets are main driver

Solutions

- Demand to grow with renewed economic vigor with EIA forecasting 2% CAGR in next 5 years for overall demand in energy
- Forecasted 7% CAGR in natural gas prices in 5 yrs
- Texas is leading way with new connectivity
- Political support for renewable energy expected to remain

Why Wind: Even in highly developed wind markets such as Germany, penetration relative to potential remains low. Large markets such as USA have very low penetration levels



Key Insights

- Both the US and China show strong potential and low current penetration
- Russia has high potential but oil dependence points to limited wind development
- PROFINA program is expected to drive wind power sector in Brazil targeting 5,000 MW by 2015
- Germany, widely considered a leading economy in adopting wind energy currently at 30% penetration

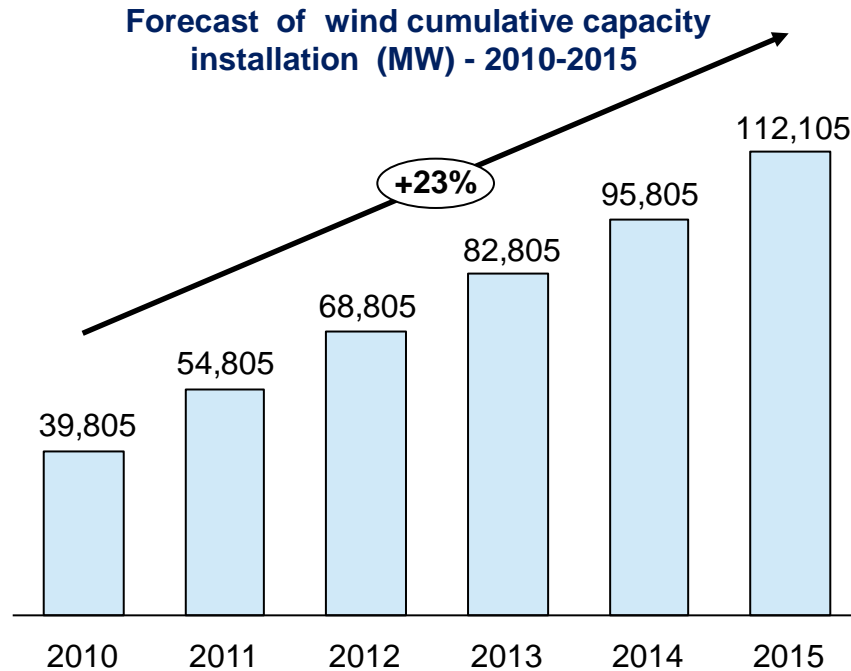
Source: Lucintel



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China wind market expected to witness robust cumulative growth rate in next 5 years

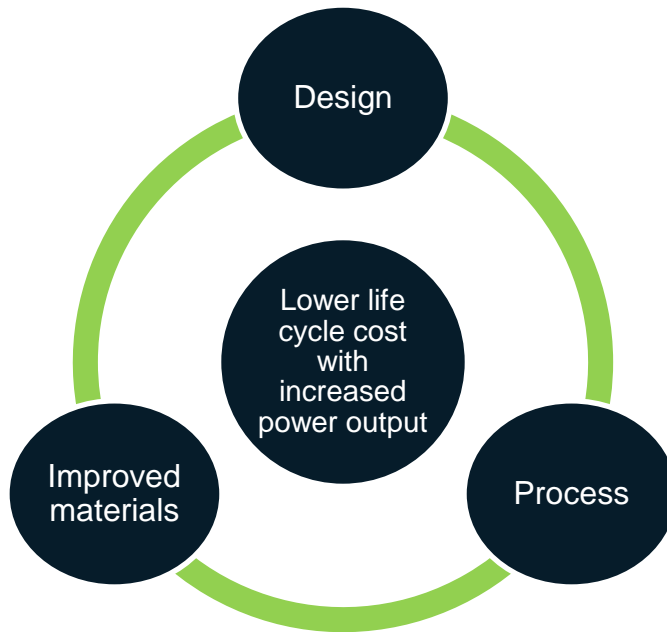
Key Insights



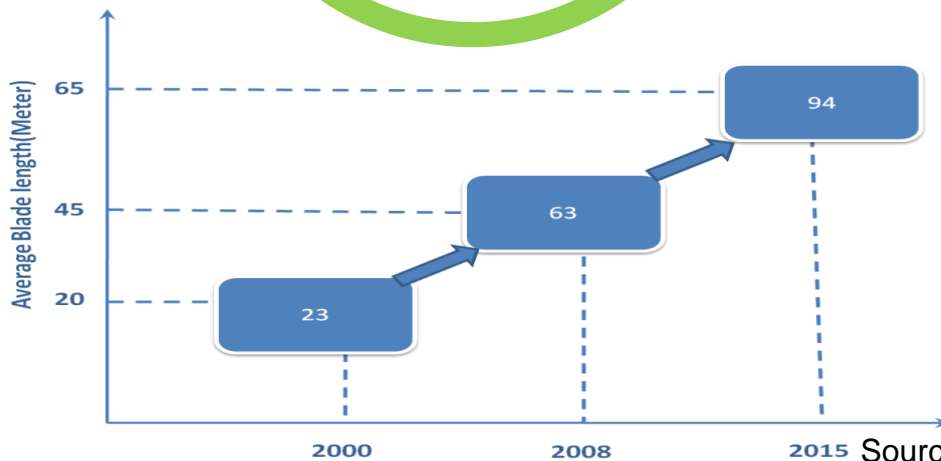
Source: Lucintel

- Total installed capacity is 860 GW (2009)
 - 30 GW contributed by renewable energy (excluding hydro)
 - Solar contributed 1% of the total renewable energy installation
- Wind is expected to remain dominant renewable source in next 10 years
 - Chinese government made commitment for 15% non-fossil fuel in total energy use by 2020 (currently at 8.5%)
- Major challenge is lack of grid capacity
 - About 30% of wind power capacity was not connected to the electrical grid

Wind Market Insights: Increasing blade length requires better blade design, improved blade materials, lower process and life cycle cost



Source: Lucintel



Source: Lucintel

Current Focus areas of Wind Blade

• Design:

- Improved Aerofoil design for better load distribution across the blade cross section area which increases reliability and performance

• Improved Materials:

- With increasing length, need for higher strength-to-weight ratio material
- Mixture of fiber glass and carbon fiber to improve the stiffness and tensile strength in the fiber direction

• Process:

- Process improvement to reduce total production time

• Lower Life cycle cost:

- Improving reliability
- Reducing manufacturing cost
- Lower Operation and maintenance cost

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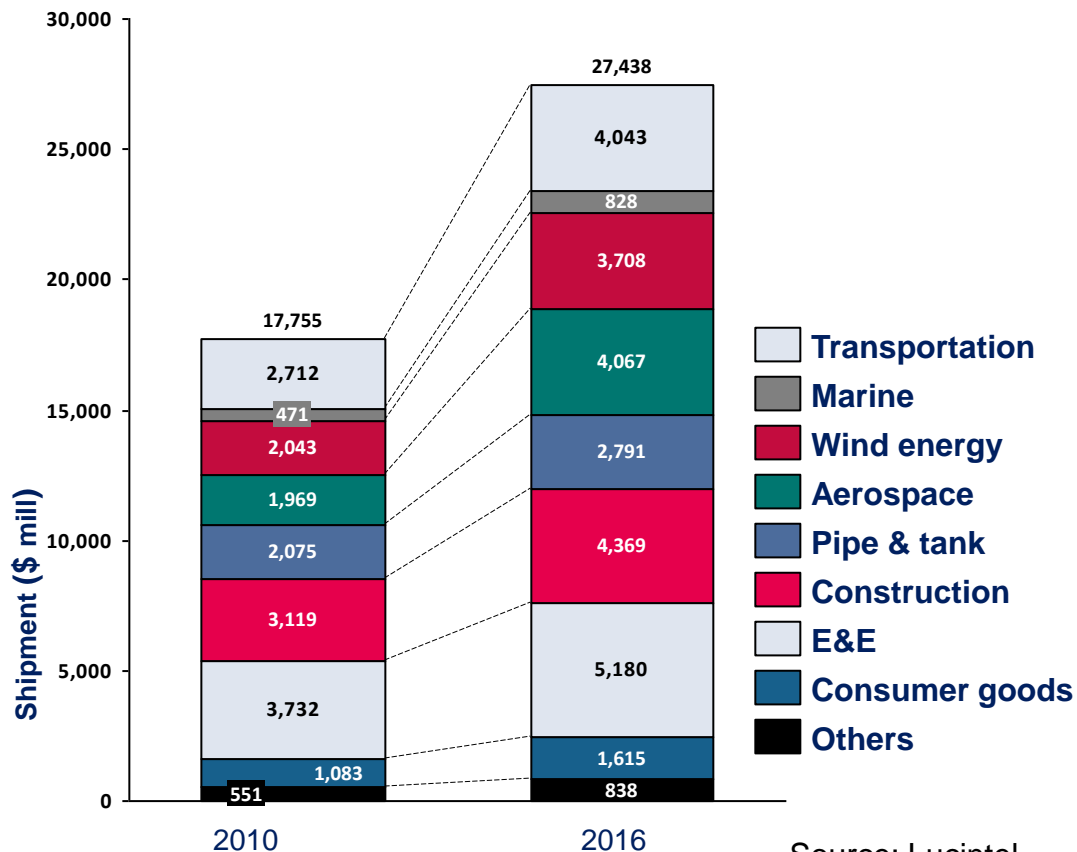


Global Composite Materials Market by Segment

Key Insights





























- Global composite materials market is expected to see a CAGR of 7.5% from 2010-2016
 - Positive sign of healthy growth on account of gradual bounce back of automotive, construction, electronics and consumer goods market
- Asia will drive future growth of composite materials. Europe to see moderate growth.

Global composite materials shipment (\$ mill) by market segment



Source: Lucintel

Relative Market Attractiveness by Region: Aerospace and Wind Energy segments show most attractive markets for growth

Market Segment	North America	Europe	Asia	Rest of World
Transportation				
Marine				
Aerospace				
Pipe & tank				
Construction				
Wind				
Consumer Goods				

- Attractiveness comparison is analyzed among different market segments of the same region
- Attractiveness is analyzed by taking different parameters such as current and future market potentials

 High
  Medium
  Low- Medium
  Low
  No



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Composites Market Potential Analysis in 2016 at Different Price Points

Applications

Composites Potential in 2016

Composites Part Price

Residential

FRP Wind
Blade

Auto Parts



US\$ 78 B

@ current price level

FRP Door

FRP Grating

FRP Window



US \$ 160 B

@ 0.85x current price

FRP Utility
pole

Swimming
Pool



US\$ 230 B

@ 0.7x current price

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Conclusions

- Composites industry is sustainable with +30,000 composites applications
- Strong Growth Expected in the foreseeable future, led by accelerated BRIC growth
- New reality in various emerging countries will change geo-political and geo-economical elements of market. . . .players must react accordingly
- New business models need to be re-invented to address fast changing complex world
 - Quarterly demands on composites shipment monitored by Lucintel show significant changes (up to 40% change Quarter by Quarter) in various market segments
- Companies driven by innovations in developing nations will maintain and gain market share
- Population growth, new infrastructural projects, urbanization, increase in middle class population, green movement will drive composites growth to new horizons
- Innovations towards lowering cost of end products by 30% has potential to 3X composites market



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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.
- Lucintel has been creating measurable value for over 10 years and for more than 1000 clients in 70 + countries worldwide.
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Recreational



Composite Materials

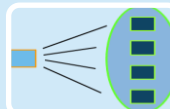
Consulting



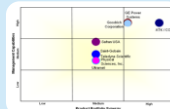
Growth and Strategic Consulting



Benchmarking



Opportunity Screening



Partner Search and Evaluation



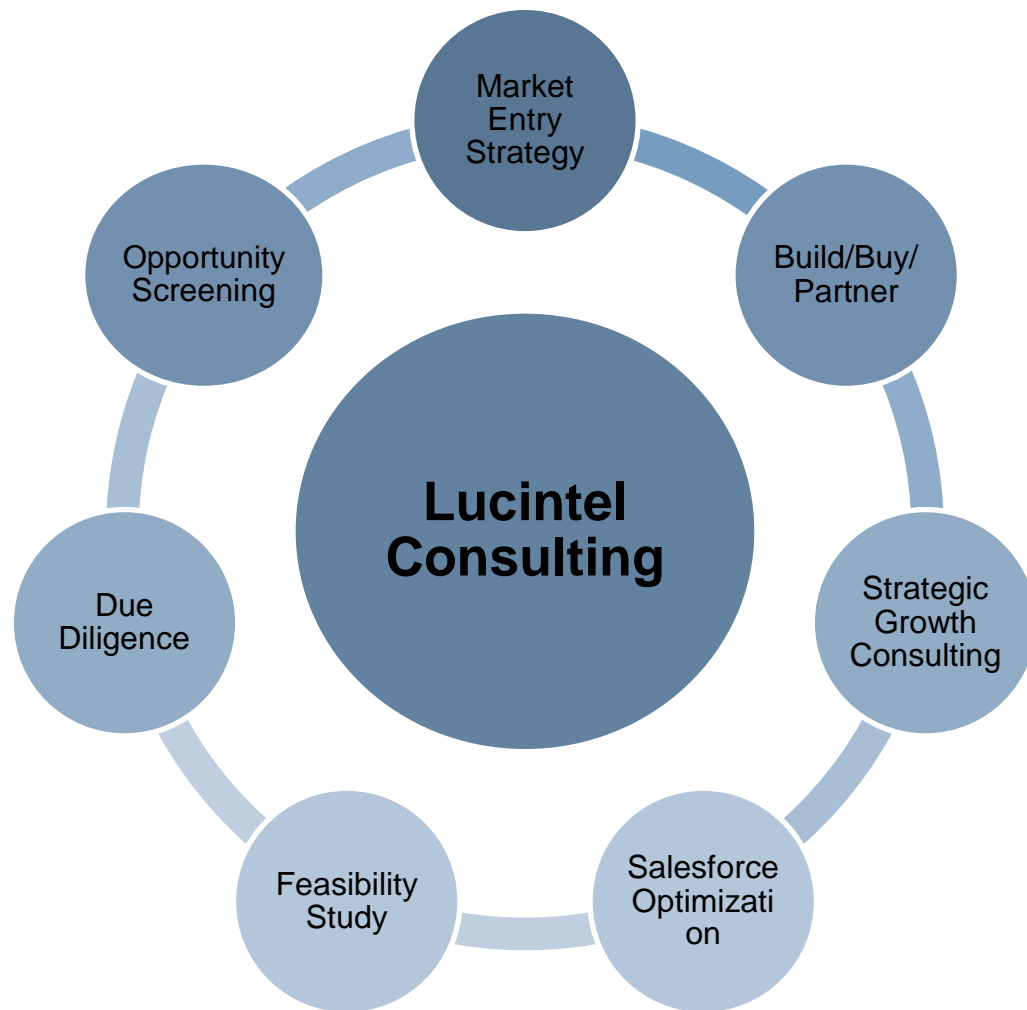
Due Diligence and M&A



Market Entry Strategy

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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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