Butyl Rubber – The Enabler of Mobility

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LANXESS Butyl Rubber Overview

Global Market Landscape

Butyl Applications for growth

Update on Investments
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## LANXESS Butyl Rubber – Business overview

| Facts       | Production capacity: ~ 400,000 t/a (incl. announced investments) |
|            | Sales: > € 500 m                                                   |
|            | Employees: ~ 900                                                   |
|            | Customers: > 200                                                  |

| Products & brands | Product groups: Regular butyl, Halobutyl |
|                  | Main brands: Butyl, Bromobutyl, Chlorobutyl |

| Markets & competition | Share: LANXESS No. 2 in oligopolistic market |
|                       | Market size: > € 3 bn in 2011 |
|                       | Competitors: Exxon Mobil Chemical, Nizhnekamskneftekhim, Sibur Holding, Sinopec, Cenway |

Source: LANXESS BTR Market Intelligence, LANXESS Internal Figures
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- LANXESS Butyl Rubber Overview
- Global Market Landscape
- Butyl Applications for growth
- Update on Investments
LANXESS is investing to become the first supplier with a truly global manufacturing footprint for butyl rubber

**Butyl world map 2012**

- **Americas**
  - LANXESS
  - Exxon

- **Europe**
  - LANXESS
  - Exxon

- **Russia**
  - NKNK
  - Sibur

- **Japan**
  - JV Exxon & JSR

- **China**
  - Sinopec
  - Cenway

- **Singapore**
  - LANXESS

**LANXESS sites**
- Sarnia, Canada
- Zwijndrecht, Belgium
- Singapore (2013)

**Market landscape 2013**

**Capacities**

- Exxon
- LANXESS
- NKNK
- Sinopec/Yanshan
- Sibur/Togliatti
- Cenway/Zhejiang

**LANXESS announced capacities**

- ExxonMobil
- NKNK, Sibur, Japan Butyl Co., Sinopec, Cenway

Source: LANXESS market intelligence based on IHS Chemicals 2012, SRI
High demand for tires in Asia and Latin America is driving growth for butyl rubber

**Regional demand split 2012e**

- Asia-Pacific: 57%
- North America: 19%
- EMEA: 19%
- Latin America: 5%

**Market development**

- CAGR (2012-2017): ~5%
  - Asia-Pacific: ~6%
  - EMEA: ~1%
  - North America: ~3%
  - Latin America: ~6%

**Main growth drivers**

- Passenger mobility
- Increasing freight (trucks)
- Radialization
- Growing middle class and improved access to medical care
- Urbanization triggers need for higher-quality building materials

* Source: LANXESS estimates; ** Source: IHS Chemicals 2012
Tyre producers are reacting swiftly
(Units: million tyres per year)

Source: Companies’ websites.
Confirmed and on-going investments/expansions covered from the Year 2011 till 2020. Non-major tire companies combined capacities is estimated at 258.6m tires/year

1Expansion by Tigar Tyres, a subsidiary of Michelin
Megatrend Mobility: Increasing car ownership rate in China and India

- China will be the growth engine for mobility
- Personal vehicle fleet in China and India expected to more than triple to ~450 m units within the next 15 years
- China and India vehicle fleet CAGR (2013-2027): ~10%
Butyl rubber demand for replacement market to increase in China in the coming years

- ~50% of Chinese tyres produced are currently exported (passenger car, light vehicle tires)
- Domestic demand growth CAGR (2011-2016): ~15%

Currently only negligible domestic butyl rubber capacities available
Mid- to long-term supply and demand for butyl rubber remains balanced to tight

- Butyl rubber market continues to grow
- LANXESS is well positioned in the global market:
  - Flexible plants in three regions
  - Focus on Halobutyl and niche regular butyl applications
- LANXESS’ business plan considers publicly announced multiple world-scale capacities which are scheduled to come on stream stepwise 2013-2020
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LANXESS’ innovation increases consumer safety through advanced technology

- *Bromobutyl* in tread offers new innovations that enable our customers to develop next generation tyres
- High-end rubber that enhances tyre traction and safety
- Most important safety parameters are:
  - Traction
  - Handling
  - Wet braking
- Partners have been identified for further development

LANXESS enables a safer driving experience for consumers
Butyl in tread applications improves all relevant safety performance indicators.

**Butyl in treads provides advantages in traction performance**

- **Wet stopping distance**
  - Distance in feet
  - Improved by -8%

- **Wet lap times**
  - Time in seconds
  - Improved by -3%

- **Tread compound characteristics**
  - Good traction
  - Rolling resistance

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*LANXESS*
Further step towards best-in-class tread performance

- Butyl in tread offers additional traction
- Technology was applied in industrial scale tyre manufacturing process without any impact on processability
- Butyl in tread already presented to selected customers with overall positive feedback
- Potential timing for first market entrance: 1-2 years

Improvements in tyre performance properties, especially under wet driving conditions

Tyre durability, reinforcement and fuel efficiency were maintained
Regular Butyl 100 for niche applications – recently reintroduced due to strong market pull

**Butyl 100**

- Modified type of butyl based on a special combination of raw materials

**Properties**

- Highest resistance against oxidative and thermal aging

**Markets**

- Curing bladders
- High-end insulation glass sealants

**Benefits**

- Higher aging resistance
- Increased service life
Research on butyl ionomers to add key properties to butyl rubber

Butyl ionomers

Post production modification where ionomers are reacted with halobutyl

Variation of ionomers content allows for control of structure, function and thus physical and dynamic properties of the polymer

New modifying properties

- Increased green strength*
- Recyclability
- Antimicrobial
- Excellent adhesion
- Pellet form
- Superior interaction between polymer and filler

* Higher resistance against deformation in time in uncured state mainly for adhesive and sealant applications
Butyl ionomers open up new applications for butyl rubber

- Properties of commercial ionomers enable their use in a wide range of applications
- Potential new applications:
  - Sports grips
  - Improved adhesives and sealants
  - Medical adhesives
  - Anti-microbial coatings
Butyl Rubber: Much more than synthetic rubber for innerliners

- New butyl for pharmaceutical closures
- Butyl ionomers
- Butyl 100 for curing bladder
- Butyl 100 for insulation glass
- Butyl 100 for adhesives
- Customer support for current applications
- Continuous improvement of products and production process
- Butyl in treads
- New products
- Existing applications
Mobility and Urbanization as underlying trends for new and existing application fields

**Megatrends**

- **Mobility**
  - Passenger mobility
  - Global tyre production
  - Radialization
  - Butyl in treads

- **Urbanization**
  - Fast cure grade for pharmaceutical closures
  - Butyl 100 in niche applications

**“Green Mobility” – Underlying growth trend**

- Mobility
- Urbanization
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LANXESS € 400 mn investment in new butyl production facility in Singapore to support growing demand
2005-2014: LANXESS has invested over €500 m, adding more than 200kt of butyl rubber capacity

- **2006:** Debottlenecking of Antwerp plant
- **2007/2008:** Two-step debottlenecking of Sarnia, Canada site
- **2010 onwards:** Second debottlenecking of Antwerp production
- **Early 2013:** Start-up of new grass-roots, world-scale Singapore facility
- **Future:** Further debottlenecking of all plants possible

LANXESS is fully committed to butyl customers’ growth
**Butyl Rubber – Strong position in a premium business**

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<tr>
<th>Global reach</th>
<th>Customer orientation</th>
<th>R&amp;D excellence</th>
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| ▪ Flexible world-scale plants in three regions  
  ▪ Consolidated presence in Europe and Americas  
  ▪ New plant in Singapore further extends our reach in the fast-growing Asian market | ▪ Professional sales force, technical support and customer service serving all markets and regions  
  ▪ Global Supply Chain with high flexibility and efficiency | ▪ Trend-setting innovations continue to offer new opportunities for tyre and non-tyre markets  
  ▪ Integrated approach for processes, products and application developments |
Butyl in Tread
LANXESS
Energizing Chemistry
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