12th Five-Year Plan of China’s Chemical Fiber Industry and Acrylic Industrial Development

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China Chemical Fibers Association
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- Industry Performance during the 11th Five-year-Plan Period
- Major Influences on the Development of Chemical Fiber Industry
- Goals of Chemical Fiber Industry during the 12th Five-year Plan Period
- Several Issues Concerning Acrylic Industry Development
Chemical fiber production has seen rapid increases. In 2010, China produced 30.9 million tons of chemical fibers, up by 85.6% from 2005 at an annual growth rate of 13.1%.

Accounting for 81.3% of the total, polyester fiber production rose to 25.13 million tons in 2010, up by 97.7% from 12.71 million tons of 2005, with an annual growth rate of 14.6%.

The most rapid growth came from nylon sector, which increased by 125% to 1.618 million tons in 2010 from 720,000 tons in 2005, with an annual growth rate of 17.5%.

In 2010, the total output value of large-scale chemical fiber enterprises in China amounted to 495 billion yuan, up by 89.8% from 2005 at an annual growth rate of 13.7%.

The total output value of polyester increased by 70.1% from 179.9 billion yuan in 2005 to 306 billion yuan in 2010, with an annual growth rate of 11.2%. In terms of output value, polyester accounted for 61.8% of the entire chemical fiber industry.

Nylon and viscose output values have been rising fast, with an annual growth rate of 20.1% and 17.6% respectively.
The consumption of chemical fibers in 2010 is expected to reach 29.95 million tons, up by 31.4% from 2005 at an annual growth rate of 11.4%.

Chemical fibers accounted for over 70% of textile feedstock.

The world financial crisis in 2008 led to the first negative growth in the consumption of chemical fibers within the past 15 years.

In 2010, assets of the chemical fiber industry amounted to 407 billion yuan, up by 65.4% from 2005 at an annual growth rate of 10.6%.

Nylon and viscose sectors have seen fast expansions, with an annual growth rate of 15.3% and 13.4% respectively.
Polyester Price Trend during 11th Five-year Plan

From 2005 to H1 2008, polyester fiber prices were largely stable, while H2 2008 saw a downtrend, especially in September and October. From 2009 to Aug 2010, prices kept firming up and, after a upsurge in Sep-Oct 2010, took a sky dive in November.

Acrylic Price Trend during 11th Five-year Plan

From 2006 to Q3 2008, acrylic feedstock prices were largely stable.

In Q4 of 2008, especially between Sep-end and October, prices dropped sharply.

March 2009 ushered in a strong uptrend which lasted for about 14 months.

May-July 2010 saw downward corrections, followed by another uptrend. Prices weakened slightly in late 2010.
Fixed Assets Investments during 11th Five-year Plan

- In 2010, the fixed assets investments of the chemical fiber industry amounted to 39 billion yuan, up by 121% from that of 2005 at an annual growth rate of 17.2%.
- In 2008, investment activities were slowed down significantly under the impact from world financial crisis, resulting in a negative growth at -5.8% in 2009. In 2010, chemical fiber industry improved rapidly and saw a quick recovery in investment growth, with a year-on-year increase at 41.3%.

Chemical Fiber Export during 11th Five-year Plan

- In 2010, China exported about 1.925 million tons of chemical fibers, a 171% increase from 2005 with an annual growth rate of 21.8%.
- Under the impact of world financial crisis, 2009 saw a negative growth in chemical fiber export, but the growth rate soon recovered to 28.7% in 2010.
- In 2010, Pakistan became the largest importer of China’s chemical fibers.
In 2010, the gross profit of chemical fiber industry amounted to about 27 billion yuan, up by 480% from that of 2005 at an annual growth rate of 42.3%.

Chemical fiber industry saw healthy profit margins in 2007, 2009 and 2010, along with sharp increases in gross profits.

With technological advancement in chemical fiber industry, the profit rates of all varieties have been expanding notably.

In 2010, the profit rate of China’s chemical fiber industry reached 5.45%, up by 3.65 percentage points from 2005.

Hereinto, the profit rate of polyester industry gained 3.99 percentage points to 5.41%, and that of viscose up by 1.97 percentage points to 6.25%.
Major Economic Indicators in 2010

Major Economic Indicators of Chemical Fiber Industry in 2010

<table>
<thead>
<tr>
<th>Items (kt, billion yuan)</th>
<th>2010</th>
<th>2009</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Fiber Production</td>
<td>30,887.0</td>
<td>26,739.0</td>
<td>15.58%</td>
</tr>
<tr>
<td>Import Volume</td>
<td>862.3</td>
<td>861.5</td>
<td>0.01%</td>
</tr>
<tr>
<td>Export Volume</td>
<td>1,929.3</td>
<td>1,476.7</td>
<td>30.39%</td>
</tr>
<tr>
<td>Total Supply</td>
<td>29,874</td>
<td>26,123.8</td>
<td>14.38%</td>
</tr>
<tr>
<td>Imp. Vol. of Synthetic Fiber Feedstock</td>
<td>15,648.3</td>
<td>14,709.9</td>
<td>6.42%</td>
</tr>
<tr>
<td>Imp. Vol. of Artificial Fiber Feedstock</td>
<td>1,198.4</td>
<td>1,066.7</td>
<td>12.35%</td>
</tr>
<tr>
<td>Gross Profit of Chemical Fiber Industry</td>
<td>25,913</td>
<td>11,717</td>
<td>121.18%</td>
</tr>
<tr>
<td>Total Loss of Loss-making Enterprises</td>
<td>1.241</td>
<td>2.522</td>
<td>-50.81%</td>
</tr>
<tr>
<td>Fixed Asset Investment of Chemical Fiber Industry</td>
<td>38.02</td>
<td>27.33</td>
<td>42.73%</td>
</tr>
</tbody>
</table>

Major Influences on the Development of Chemical Fiber Industry

- The change and tendency of international macro-economic environment
- The change in China’s domestic macro-economic environment and policies
- Increasing demand from domestic textile market
- Production factors — Supply/demand balance and price changes
- Technological advancement and structural adjustment within chemical fiber industry
- Investment growth and newly-added capacities
Major Influences on the Development of Chemical Fiber Industry

- **The change in international macro-economic environment**
  - World financial crisis
  - Change of consumption mode in developed countries
  - Recovery rate of world economic growth
  - More intense conflicts in international trade
  - Stronger tendency of global inflation

- **The change in China’s domestic macro-economic environment and policies**
  - Industrial Adjustment & Revitalization Planning
  - Exchange rate adjustments
  - Monetary policy, fiscal policy, industrial policies
  - The 12th Five-year Plan
  - Commodity price control and regulation, etc.
  - Increasing demand from domestic textile market
  - Supply/demand balance and pricing of production factors
  - Technological advancement and structural adjustment within the industry
Major Influences on the Development of Chemical Fiber Industry

- The change in China's domestic macro-economic environment and policies
  - The 12th Five-year Planning of Textile Industry
  - Monetary policy, exchange rate adjustments, fiscal policy
  - Related industrial policies — to eliminate out-dated capacities; to implement Conditions of Entry
  - Countermeasures of inflation — Real estate and commodity price regulation and control

Influence — Price Trend of Crude Oil

Price Trend of Crude Futures (1 Jan 2010–23 Feb 2011)

Source: CCFEI
In 2010, China imported about 15.6 million tons of synthetic fiber intermediates, an 28.2% increase from 2005 with an annual growth rate of 5.1%.
- PTA shortage was eased by the quick expansions of domestic capacities. In 2009, the import dependency ratio dropped to 34% from 54% in 2005.
- Some intermediates faces greater shortage. China’s chemical fiber industry is highly dependent on EG, CPL and AN imports.
- In 2010, China imported 964kt wood pulp, a 13.3% increase on year, while the import dependency ratio reached 95%.
Price Trend of Chemical Fiber Feedstock

- Price trend of nylon chain (CPL/PA/70D FDY, Jan 2010-23 Feb 2011)
- Price trend of acrylic chain (ACN, top, staple fiber, Jan 2010-23 Feb 2011)

Source: CCFEI

Price Trend of Cotton

- Comparison of cotton and staple fibers

Source: CCFEI
8th China International Acrylonitrile & Acrylic Fiber Forum

Price Trend of Cotton

Price Trends of Zhengzhou cotton futures, NYMEX cotton futures and domestic spots during 1 Jan 2010-Feb 2011

Source: Green Futures

Cotton Futures vs. PTA Futures

Price Trends of Zhengzhou cotton futures and PTA futures (4 Jan 2010-12 Feb 2011)

Source: Green Futures
Technological Progress

Remarkable progresses achieved by the industry

| PET Polymerizing | Single-line capacity up to 900-1,200t/d from 600t/d Unit consumption down by 20% Cost down by 15% |
| Polyester Fiber Spinning | Shift from side quenching to circular one in direct spinning process Able to produce fine denier 200/144F, dpf 0.13 On-line viscosity enhancing On-line master batch adding and nanometer function |
| Nylon Polymerizing | Single-line capacity surpassing 200t/d Diameter of polymerization VK tube >2 meters |
| Spandex | Continuous polymerization High-speed spinning (fine denier) Eco-friendly solvent (DMAC) |
| Viscose | Single-line capacity surpassing 45kt/yr and reaching 60kt/yr DPF up to 20 denier, could be blended with 120S Core dyeing technology Expanded application (medical, non-woven) |

Technology Progress

Development of integrated polyester complex in China during the 10th and 11th Five-year Plan

<table>
<thead>
<tr>
<th>10th Five-year Plan</th>
<th>11th Five-year Plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-line Capacity</td>
<td>150-200ktyr</td>
</tr>
<tr>
<td>Investment Total</td>
<td>180-230 million yuan</td>
</tr>
<tr>
<td>Unit</td>
<td>1,000-1,500 yuan/ton</td>
</tr>
<tr>
<td>Construction Period</td>
<td>14 months</td>
</tr>
<tr>
<td>Operation Costs</td>
<td>1,000-1,500 yuan/ton</td>
</tr>
<tr>
<td>Progress Features and Status</td>
<td>Homemade equipments of high capacity Mainly direct spinning Low investment costs High fineness (direct spinning, able to produce dpf0.3-0.5 fibers)</td>
</tr>
<tr>
<td></td>
<td>Homemade equipments of high capacity Low investment costs Highly integrated Shorter progress (esterification up from 600 to 1,200 t/d, polycondensation up from 600 to 900 t/d)</td>
</tr>
</tbody>
</table>
Product Structure optimizing achieved great success

- Differential rate of chemical fibers reached 42.7% in 2009, up by 11.7 percentage points from 2005. In 2010 the rate is expected to reach 46.5%.


- Breakthroughs had been made in R&D, engineering & industrialization of high-tech chemical fibers including carbon fiber T300, aramid fiber 1313, PPS, UHMWPE and continuous basalt fiber, etc.
New Capacities

- Many new capacities to come on stream during 2011-2014
- With a preliminary estimate, there will be around 2.6 million tons of new chemical fiber capacities in 2010
- There will be around 3-4 million tons of new capacities to come on stream in 2011
- There will be more than 3-4 million tons of capacity increase each year on average during 2012-2014

The 12th Five-Year Plan —
Goals for Chemical Fiber Industry

Goals and Plans
1. Mid-to-long Term Targets in General
2. Targets in Detail
   —— Steady and sustainable development of the industry
   —— Structural optimization and coordinated development in East, Central and West China
   —— Better utilization of resources
   —— Higher capability of innovation
Major Goals for Chemical Fiber Industry during the 12th Five-Year Plan (preliminary version)

<table>
<thead>
<tr>
<th>Metric</th>
<th>2008</th>
<th>2015</th>
<th>2015 AAGR</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacity of Chemical Fibers</td>
<td>2712</td>
<td>4057</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Production of Chemical Fibers</td>
<td>2405</td>
<td>2950</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Import Volume of Chemical Fibers</td>
<td>62</td>
<td>90</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Export Volume of Chemical Fibers</td>
<td>71</td>
<td>163</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Consumption Volume of Chemical Fibers</td>
<td>2316</td>
<td>2867</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Proportion of Processed Chemical Fibers</td>
<td></td>
<td></td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
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<td></td>
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<td>Estimated</td>
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<tr>
<td>Proportion of Processed Chemical Fibers</td>
<td></td>
<td></td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Differential Rate</td>
<td>39%</td>
<td>46%</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Unit Output Value (yuan/person)</td>
<td>160,000</td>
<td>190,000</td>
<td>250,000</td>
<td>Estimated</td>
</tr>
<tr>
<td>Proportion of Three Major Applications</td>
<td>32%</td>
<td>21%</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Energy Consumption (TCE/T)</td>
<td>580.7</td>
<td>516.8</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Water Consumption (T/T)</td>
<td>15.56</td>
<td>11.4</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Waste Water Emission (COD, kt)</td>
<td>113.9</td>
<td>103.8</td>
<td></td>
<td>Estimated</td>
</tr>
<tr>
<td>Waste Gas Emission (NM3)</td>
<td>4136.3</td>
<td>4227.3</td>
<td>3805</td>
<td>Estimated</td>
</tr>
</tbody>
</table>

Major Tasks for Chemical Fiber Industry during the 12th Five-Year Plan

1. To promote the application of advanced new technologies in production, to raise the proportion of functional and differentiated fibers, and promote the application of chemical fibers in industrial area.
2. To bring forward R&D of high-tech fibers and industry integration, as well as expand the application territory.
3. To accelerate R&D and promote application of biopolymer fibers and biochemical feedstock.
4. To actively seek for opportunities in overseas market.
5. To accelerate localization of key processes and machinery.
6. To strengthen efforts in energy saving and environment protection.
7. To accelerate assets recombination and increase industry concentration.
8. To improve standardization of the market including certification and market access systems, and improve information service for the market.
Goals for High-tech Fibers during 12th Five-Year Plan

<table>
<thead>
<tr>
<th>Year</th>
<th>Aramid 1313</th>
<th>UHMWPE</th>
<th>Carbon Fiber</th>
<th>PPS</th>
<th>Aramid 1414</th>
<th>Basalt Fiber</th>
<th>Lyocell</th>
</tr>
</thead>
<tbody>
<tr>
<td>In 2010</td>
<td>≥6000</td>
<td>≥3000</td>
<td>≥3000</td>
<td>≥1000</td>
<td>≥500</td>
<td>2500</td>
<td>Industri alization</td>
</tr>
<tr>
<td>Completed (est.)</td>
<td>7000</td>
<td>5000</td>
<td>3000</td>
<td>3000</td>
<td>1000</td>
<td>4000</td>
<td>2000</td>
</tr>
<tr>
<td>2015</td>
<td>10000</td>
<td>8000</td>
<td>6000</td>
<td>7000</td>
<td>4000</td>
<td>6000</td>
<td>15000</td>
</tr>
<tr>
<td>2020</td>
<td>150000</td>
<td>12000</td>
<td>10000</td>
<td>10000</td>
<td>8000</td>
<td>9000</td>
<td>50000</td>
</tr>
</tbody>
</table>

Guiding Policies

1. To provide better political supports
2. To encourage industry innovation and upgrading
3. To coordinate development of feedstock industry
4. To maintain sound market environment for the industry
5. To improve construction of standardization system
6. To improve information service
Acrylic Fiber — Demand

Acrylic Fiber Capacity and Demand in China during 2002-2017

Acrylic Fiber — Import Reduce, Self-supply Increase

Acrylic Fiber Import during 1999-2010

Self-supply Rate during 1999-2010
**Acrylic Fiber — Consumption**

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Apparel</td>
<td>Decoration</td>
</tr>
<tr>
<td>70%</td>
<td>3%</td>
</tr>
</tbody>
</table>

**Acrylic Fiber — Targets Set by the 12th Five-year Plan.**

To become a world acrylic fiber production base with global competitiveness

**Targets in detail:**

- To expand total capacity to 1,200kt/yr, with capacity utilization rate above 95%, and average capacity of producers above 70kt/yr.
- To optimize the consumption structure, with proportion of apparel, decoration and industrial items at 60: 30: 10.
- To limit processing costs to below 3500 yuan/ton, and raise unit output value to above 1.08 million yuan per person.
- To improve product quality and enhance environment protection, and encourage enterprises to meet the standards of ISO14001, ISO18001 and ISO19001.
Acrylic Fiber -- Advices

- To be more self-dependent in feedstock supply and lower feedstock costs by accelerating the development of acrylonitrile industry
- To enhance basic R&D and expand application of acrylic fiber
- To increase the concentration of the industry and forge 1-2 enterprises with leading-edge competitiveness and independent intellectual properties.
- To increase investment in R&D of differentiated fibers in order to meet varied demands
- To accelerate the progress of consumption structure adjustment and raise the proportion of industry purpose consumption to above 10%.
- To lower processing costs while improve product quality
- To develop and adopt eco-friendly technologies, and abandon backward processes and equipments

Thank You
Any Advice is Welcome