

Strategic Transformation for Future Petroleum and Chemical Industry in China

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Pathway Choices of Strategic Transformation of China's Petroleum and Chemical Industry



Pathway I: Structural Upgrade



Pathway II: Technology Empowerment



Pathway III: Green Development



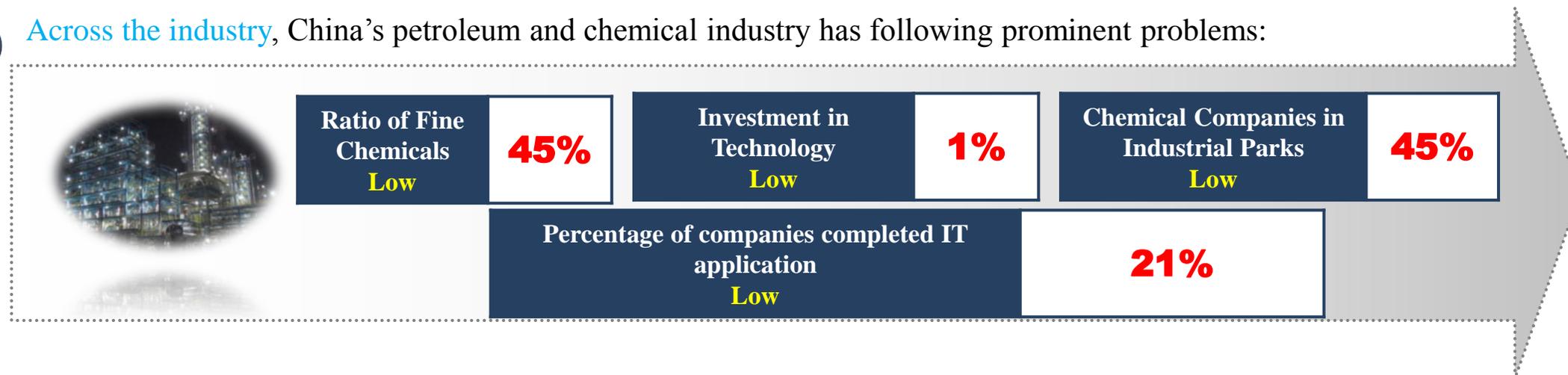
Pathway VI: Smart Transformation

① **Globally**, international petroleum and chemical industry is competed by economies with three types of competitive advantages: resources, technology and market.

	Market	Resources	Technology
Region	China, India, Southeast Asia	Middle East, North America	Europe, US, Japan, Republic of Korea
Features	Major markets for newly-added chemical needs	Abundant in quality resources such as petroleum and ethane	Advanced in technology and obtain enormous benefits from globalized companies

② **Domestically**, China's economy has been transitioning from a phase of rapid growth to a stage of high quality development. We must apply a new vision of development, transform growth mode, improve economic structure, foster new drivers of growth and further supply-side structural reform.

③ **Across the industry**, China's petroleum and chemical industry has following prominent problems:



Three Key Factors

Electrification of the Automobile Industry

- Automotive building and automotive transportation are the largest downstream markets for the petroleum and chemical industries;
- Major oil importing countries are actively developing new energy vehicles.

Supply-Side Structural Reform of Agriculture

- Agriculture is one of the main downstream markets of petroleum and chemical industry. Agrochemical is third largest sector following automotive chemicals and construction chemicals
- Zero growth of pesticide and fertilizer
- Agricultural policy focus has shifted from growth to quality

Prevent and Control Pollution

- The battle for pollution prevention and control is one of the three major battles committed by the central government. It is an important barrier that must be overcome to achieve high-quality development and build a well-off society in an all-round way.

Pathways: Actively upgrade industrial structure, enhance the role of technology innovation, promote green and smart development, increase core competitiveness, in order to push China from a large chemical country to a strong chemical country.



Meeting people's ever-growing needs for a better life



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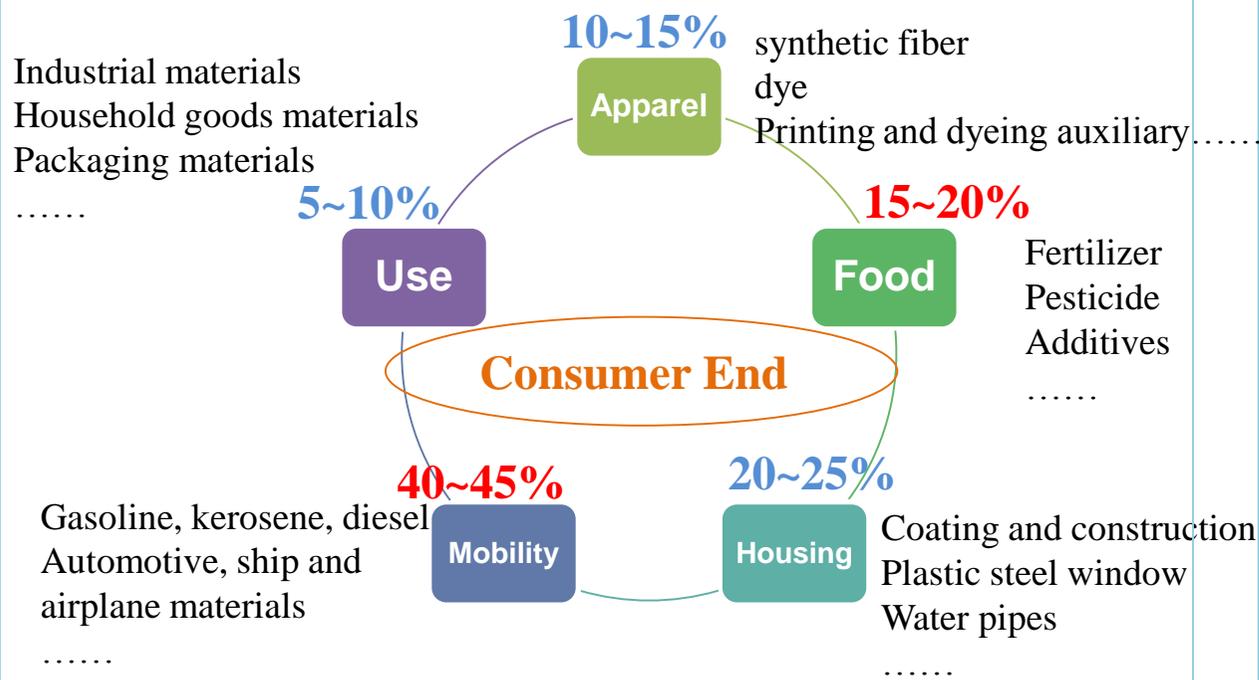


Pathway VI: Smart Transformation

1.1 Electrification of the Automobile Industry and Supply-Side Reform of Agriculture will Speed up Structural Upgrade of Petroleum and Chemical Industry

- ◆ MOBILITY is the largest end market for petroleum and chemical industry. It is also the industry for which future has the most drastic changes in store. **The electrification of automobile industry** will disrupt automotive chemical and petroleum and chemical industry at large.
- ◆ FOOD is the third largest end market. It is the least growing market for chemicals. Total consumption of fertilizer and pesticides in China will realize zero growth. **Supply-side reform of agriculture** and providing agricultural services will be the direction for agro chemical transformation.
- ◆ Fine chemical industry accounts for a relatively low share of the whole chemical industry. High-end and differentiation is the main directions for chemical industry transformation.

Composition of End Markets



Influence from electrification of automobile industry

- **Petroleum exploration** Heavy costs make survival difficult
- **Oil and oil product trade** Large medium to long term effect
- **Refining and chemical** Structural impact

Structural Adjustment of Petroleum and Chemical Industry

1.2 Structural Upgrade-Refining Industry

Structural upgrade choices: less oil and more chemicals; from fuel-type refineries to raw material-type refineries. Refining and chemical integration; develop petrochemical bases, large-scale production capacity, fine chemical capacity; reduce costs and increase product added value through deep processing; realize **the fine production of**

Narrowing consumption in oil products

- Kerosene keeps growing fast
- Gasoline and diesel slowed down significantly

Rapid growth of electric vehicles

Fuels → Raw Materials

Petrochemical Bases Building

- Seven Petrochemical bases

Large Scale

- Ten million tons of oil refining capacity
- Million tons of ethylene production capacity

Raw Material Improvement

- Crude oil selection
- Petrochemical raw material selection

Fine Management

Fine Production of Commodities

Rapid growth of needs in chemicals

- Ethylene/propylene
- Fine chemical products
- High-end chemicals

Refining and Chemical Integration

- added value of products 25% ↑
- construction investment 10% ↓
- comprehensive energy consumption 15% ↓

Low cost methods

- Crude oil to ethylene
- Syngas to ethylene
- Methane to ethylene
-

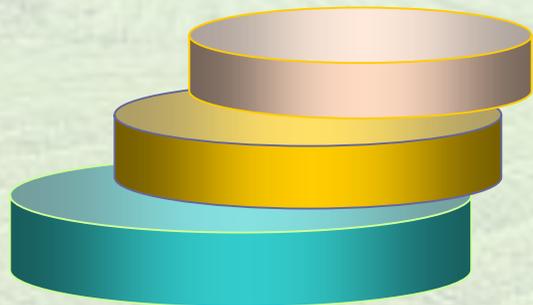
1.3 Structural Upgrade-Agrochemicals

Structural upgrade choices: **structural upgrade of agricultural inputs** (new type of fertilizer, environmental protection pesticide) ; accelerate the development of **agricultural service** (comprehensive agricultural service) and **IT application in agriculture** (smart agriculture)

Policy focus has shifted from growth to quality

Supply-Side Reform in Agriculture

“Feed the Chinese Well”



“Feed the Chinese”



- Planting Solution
- Smart Agriculture
- Sell quality rice
-

Comprehensive Agricultural Services

- High efficiency
- Low poison
- Low residue

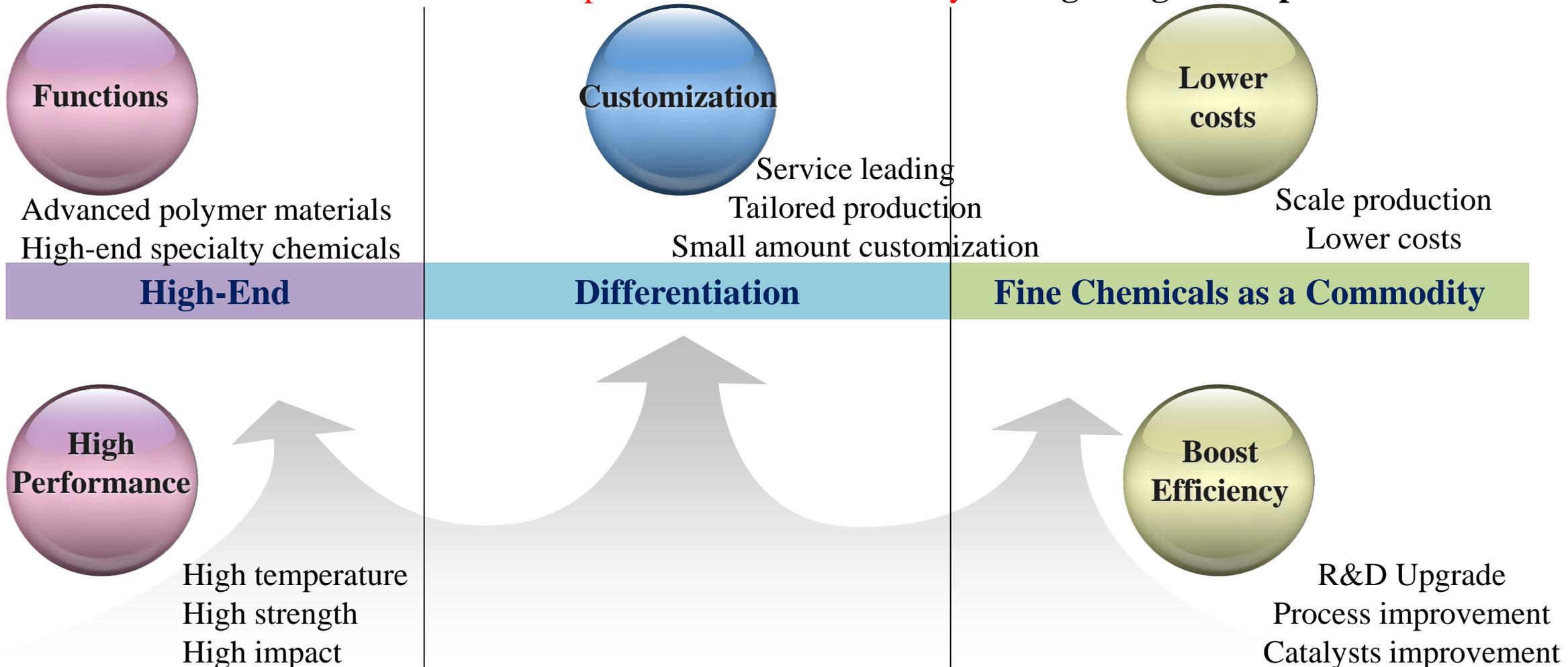
Environmental Protection Pesticide

- Organic Fertilizer
- Microbial fertilizer.....

New Type of Fertilizer

1.4 Structural Upgrade-Fine Chemical Industry

Structural upgrade choices: develop **high-end chemical new materials**, improve self-sufficiency rate; develop **differentiated** products to meet individualized needs; some of the fine chemical products with large demand can reduce the cost and **turn fine chemical products into a commodity through large-scale production**.



Industrial Structure Adjustment

1 Transformation and Upgrading of Refining Business

- Developing refining and chemical integration on the base of Sinochem's refining strength: Sinochem Quanzhou Petrochemical Base
- Refining business upgrades from fuel-oriented to raw material-oriented

2 Develop Four Strategic Emerging Industries

- New material
- New energy
- Biology
- Environmental Protection

Business Model Restructure

1 Energy and Chemical Internet

- Brand new model of self-run business + platform + industrial chain + ecosystem
- Give play to comparative advantage in international trade, storage and logistics

2 Modern Agricultural Platform (MAP)

- Comprehensive services + quality agricultural inputs + Internet
- Integrate planting, climate, finance and marketing services
- Combine online and offline services through Internet and Internet of things



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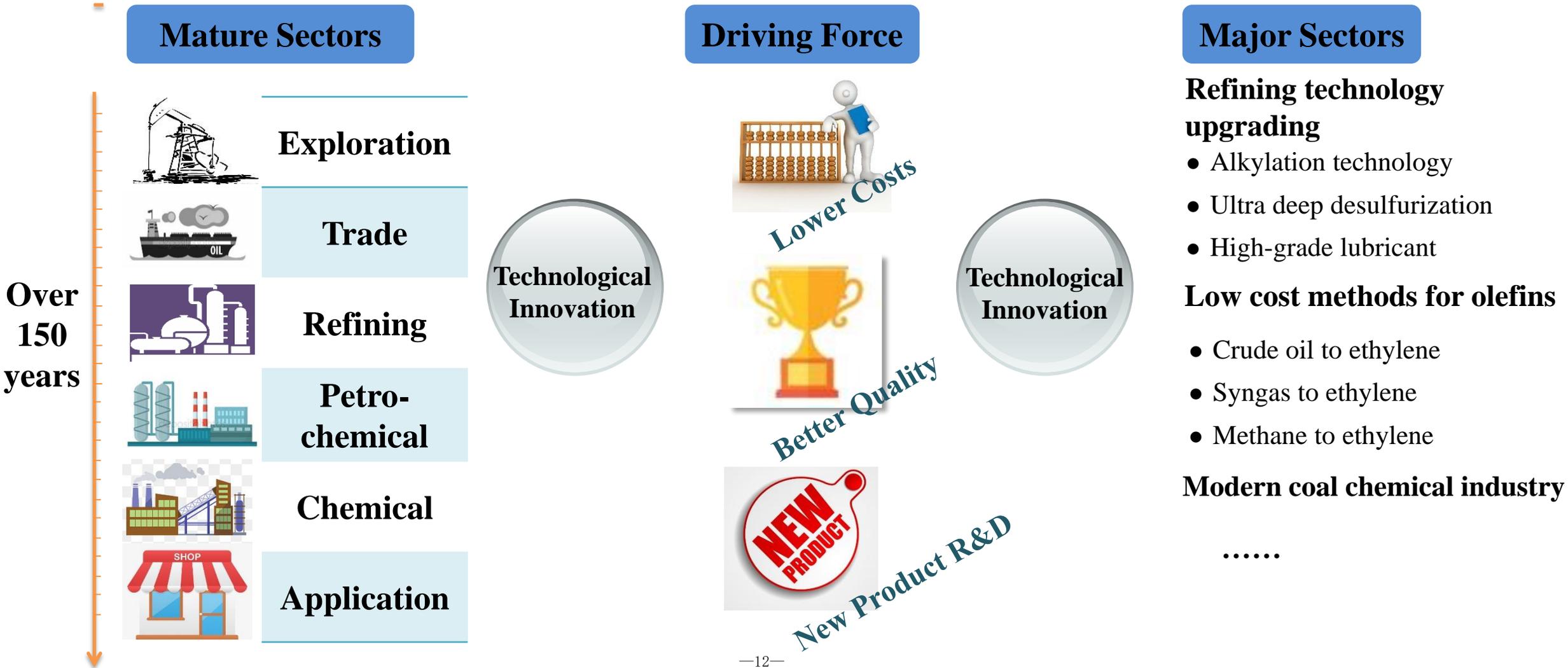
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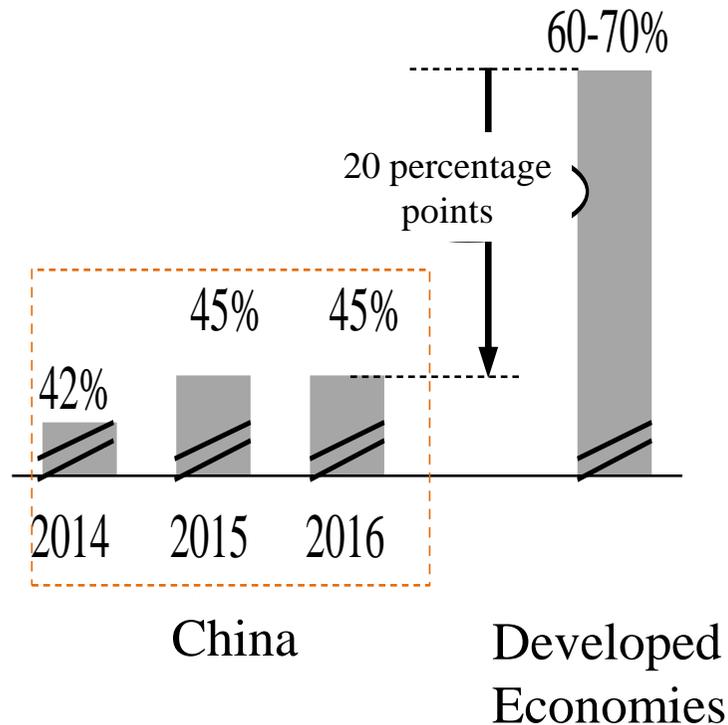
2.1 Technology Empowerment-Technological Upgrade of Refining Sector

The focus of technological innovation in the development of the refining and chemical industry is mainly in the areas of refining technology upgrading, low-cost olefins and modern coal chemical industry.



2.2 Technology Empowerment-Improve the fine chemical industry rate and focus on the development of new chemical materials

Low Rate of China's Fine Chemical Industry



Heavy reliance on import of new chemical materials

The Thirteenth Five-Year Plan of New Chemical Materials

	Product	Self-sufficiency Rate in 2015	Self-sufficiency Rate in 2020
I	High performance resin	63%	83%
1	Engineering plastic	49%	76%
2	High-end polyolefin plastic	38%	69%
3	Polyurethane resin	96%	98%
4	Fluorosilicone (including silicone oil)	103%	111%
5	Other high performance resin	110%	100%
II	Special purpose rubber	66%	80%
1	Petroleum-based special rubber	56%	73%
2	Non-petroleum-based special rubber	100%	98%
III	High performance fibre	84%	92%
IV	Functional membrane	54%	75%

1

Develop new chemical materials sector by industrializing the scarce varieties and enhance existing varieties

2

Break through the bottleneck of key upstream feedstock supply

3

Extend to high-end downstream products and accelerate the application of new chemical materials in new areas

At the beginning of April 2018, Sinochem Group held a high-level seminar themed on “In Science We Trust”, during which an exciting and broad consensus was established that the company is on the threshold of being transformed and upgraded to be driven by technology and innovation.

In Science We Trust

“In Science We Trust” as core values of our company

Be transformed into an innovative enterprise driven by science and technology in an all-round way

- Develop four strategic emerging industries of new materials, new energy, biology and environmental protection with new chemical materials as the core, enhance the advanced manufacturing capabilities of high-end products such as new chemical materials, safeguard industrial safety and national defense security, and lead the transformation and upgrading of China’s chemical industry
- Transform traditional industries with modern information technology to create a **digital Sinochem**
- Nurture a large number of unicorn enterprises with high technology level, strong innovation ability and sustainable growth, and **lead the industry with scientific**



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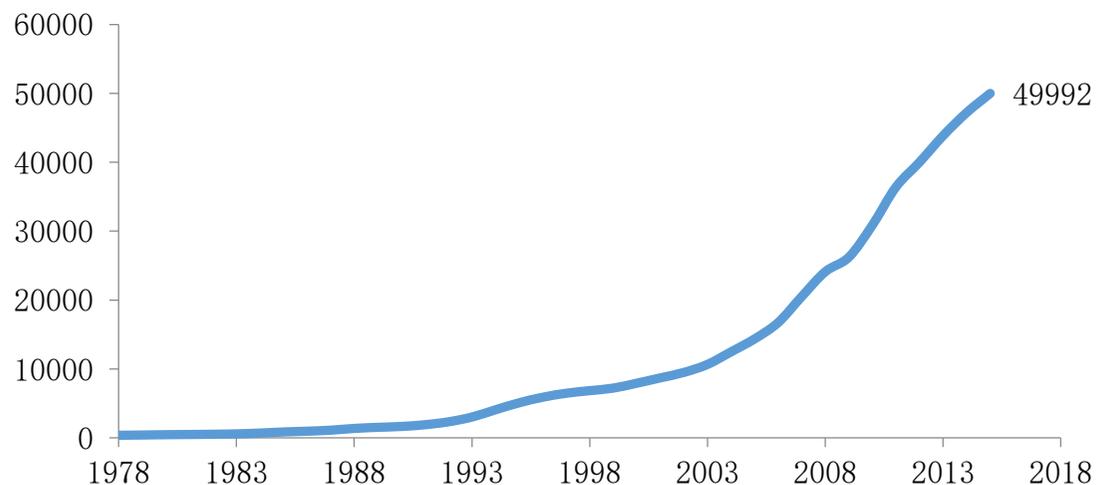
Pathway VI: Smart Transformation

3.1 Green Development: China's economic development has entered the stage of tackling environmental issues

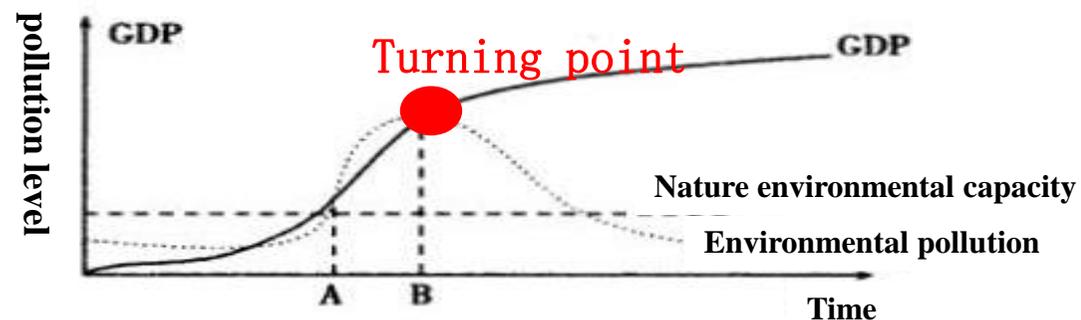
Regarding the development courses of other countries, **relationship between economic development and environmental pollution follows the Kuznets curve**. The curves illustrates that the environmental pollution is relatively low when a country is underdeveloped, but as the income per capita increases , environmental pollution becomes more serious, which means economic growth leads to environmental degradation. The pollution reaches the highest point when GDP per capita reaches 7000-8000 dollars, then the pollution decreases as GDP per capita increases. Currently, **China's GDP per capita has exceeded 8000 dollars, reaching a turning point of the environmental Kuznets curve**.

It is stated in **the 19th NPC Congress report** that Socialism with Chinese characteristics has entered a new era. The principal contradiction facing Chinese society has evolved into the contradiction between unbalanced and inadequate development and **the people's ever-growing needs for a better life**.

China GDP per capita, yuan



Environmental Kuznets Curve



Schematic diagram of the relationship between economic development and environment

Source: Cnki, Founder Securities

3.2 Green Development: creating a fairer and more reasonable competitive environment for petrochemical enterprises

The Central Economic Work Conference requests a thorough transformation of heavily polluted sectors such as energy and chemical industry, especially enterprises that is built against regulation with heavy pollution. The conference also requires pollution emission standards to be adjusted and optimized, polluters' accountability to be strengthened, deadline for compliance to be implemented, and those who doesn't meet the compliance standards by time should be shut down.

Legal basis	Management System	Pollution Prevention and Control Action Plans	Central Environmental Inspection
<ul style="list-style-type: none">• 2014, Environmental Law• 2016, Amendment to the Air Pollution Prevention Law• 2017, Judicial Interpretation of Environmental Pollution Crimes• 2017, Environmental Tax Law• 2017, Water Pollution Prevention Law Amendment• 2017, Draft on Soil Pollution Prevention and Control Law	<ul style="list-style-type: none">• 2015, Environmental Protection Inspection System• 2015, Party and government cadres environmental accountability measures• 2016, Vertical management reform of environmental protection agencies• 2016, The River Chief System• 2016, Discharge Permit System	<ul style="list-style-type: none">• 2013, Air Pollution Prevention and Control Action Plan• 2014, Water Pollution Prevention and Control Action Plan• 2015, Soil Pollution Prevention and Control Action Plan	<ul style="list-style-type: none">• First round• July 2016, the first batch• November 2016, the second batch• April 2017, the third batch• August 2017, the fourth batch• Second Round

3.3 Green Development: Chemical Environmental Protection Business Faces Good Development Opportunities

Industrial pollution has reached its turning point
China's GDP per capita has exceeded 8000 dollars

Inspection on environmental protection has been continuously tightened

Environmental tax, normalization of inspection, establishment of environmental protection system

Implement third-party governance model

Changing from “polluters should tackle” to “polluters should pay” and professional governance

Marketization of investment operations

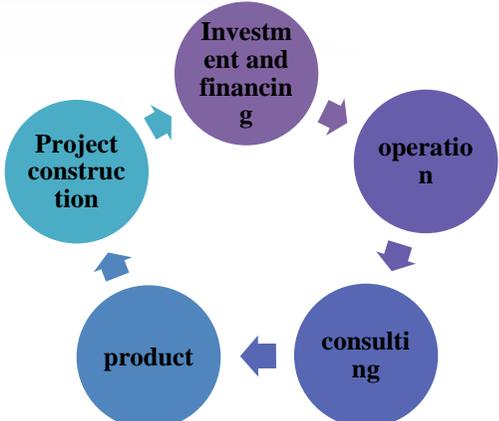
Improve related charging policies

Chemical environmental protection is expected to become a hot issue

Chemical industry's three wastes accounted for a high proportion, requiring entry into the park

In 2025, the third-party governance rate of chemical environmental protection will reach 80%. Entry rate of chemical companies into chemical park will reach 90%. Market value of environmental protection third-party governance in the chemical park will exceed 700 billion yuan

Projects	2017	2020E	2025E	Notes
Chemical Output Value (trillion yuan)	13.8	18.4	25.7	Annual growth rate at 10% and 7%
Chemical Environmental protection cost (100 million yuan)	5520	7360	10280	4% of output value
Environmental protection facilities Third-party operating rate	20%	50%	80%	Third-party operating rate gradually reaches the level of developed countries
Entry rate of chemical companies	45%	65%	90%	
third-party governance demand of chemical park (100 million yuan)	500	2400	7400	

Clean Production	Gathering development	End treatment
<p>Clean production process</p> <p>Rubber Chemicals</p> <ul style="list-style-type: none"> • 6PPD • Insoluble sulfur • Accelerator <p>Fine chemicals</p> <ul style="list-style-type: none"> • Epichlorohydrin • 	<p>Park Development</p> <p>Sinochem Quanhui Exclusive Park</p> <ul style="list-style-type: none"> • Planned area of 33.8 square kilometers • Planning to construct a 10-million-ton "refinery-chemical-synthetic fiber" integrated base <p>Sinochem Lianyungang Industrial Park</p> <ul style="list-style-type: none"> • Planned area of 2760 acres • Planning to construct a recycling economic industrial park of fine chemicals 	<p>Chemical environmental protection industry</p> <p>Strategic Positioning A leading integrated environmental service provider for industrial park</p> <p>Development direction and focus</p> <ul style="list-style-type: none"> • Chemical wastewater and chemical hazardous wastes treatment • Chemical pollution site treatment  <pre> graph TD A((Project construction)) --> B((Investment and financing)) B --> C((operation)) C --> D((consulting)) D --> E((product)) E --> A </pre>



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4.1 Smart Chemicals: Digital Transformation

- ◆ Global data is growing rapidly, doubling every 18 months. It is estimated that the annual global data production in 2020 will be 45 times that of 2009.
- ◆ **Digital transformation** needs to be based on that of **business transformation** (combination of business and digitalization), **technology transformation** , and **organizational transformation** .
- ◆ Through digital marketing, digital manufacturing, digital supply chain, digital R&D, and digital integrated management, digitalization can enable traditional manufacturing companies to increase EBITDA by 8-13% .

We are at the crossroad of digital transformation



As of 2017, China's Internet size reached 772 million people



It is estimated that the number of connected devices in the world will reach 34 billion by 2020



From Informatization to Digitalization



Business model refactoring

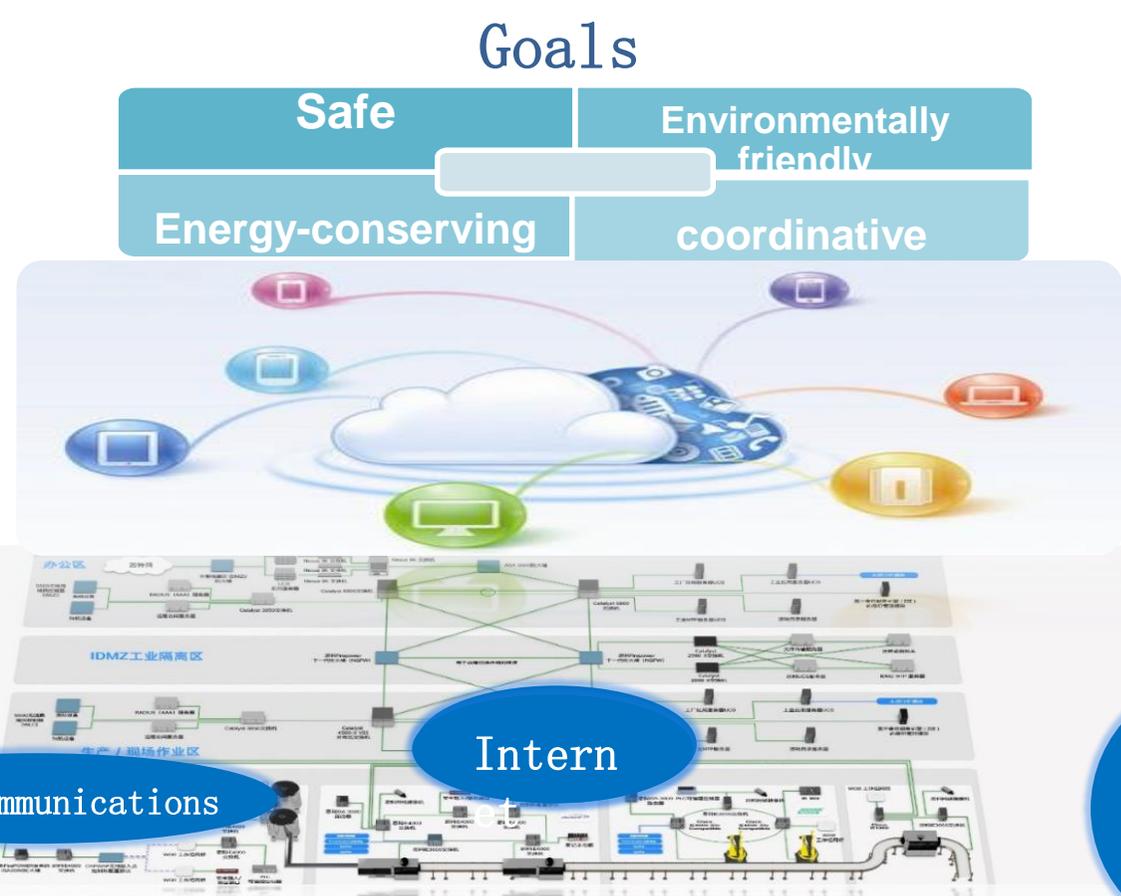


All-field integration

4.2 Smart Chemicals: Smart Park

- ◆ The Smart Park is based on modern communication technology, namely the underlying network facilities, as well as new technologies such as big data, Internet of Things, and cloud computing, to meet operational needs and achieve comprehensive operational management of park security, environmental protection, energy conservation, and smart coordination.
- ◆ At present, **there are more than 600 parks focusing on petroleum and chemical industry in China, including two demonstration units of smart parks: Jiaxing Port Chemical Industrial Park and China New Chemical Materials (Liaocheng) Industrial Park.**

comprehensive
operational
management platform
Big data cloud
platform
Network
communication



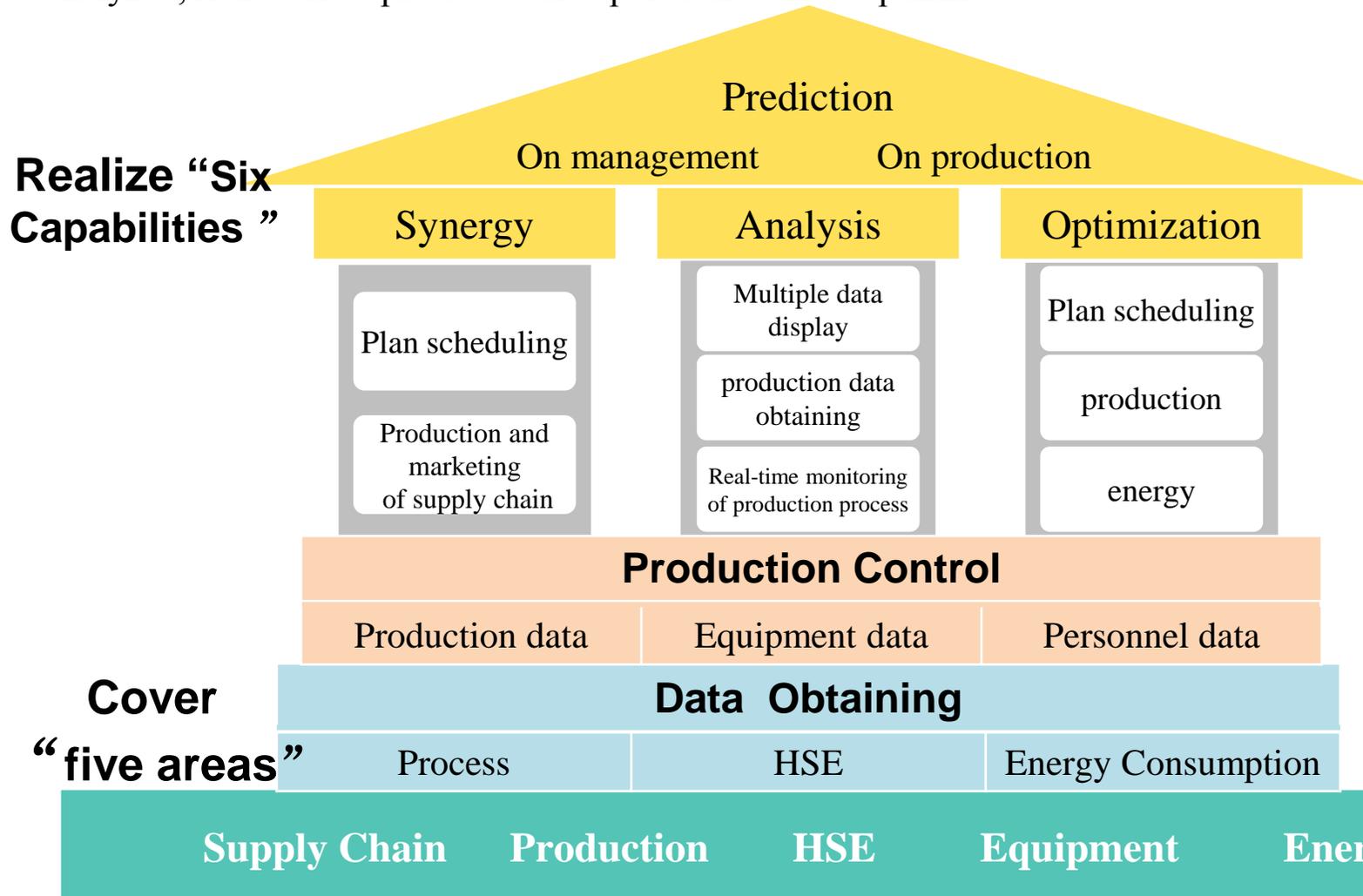
Digitalization of core businesses

- ✓ Process
- ✓ Operation
- ✓ Monitoring and Decision Making

Intern
et of
things

4.3 Smart Chemicals: Smart Factory

Smart factory should cover five areas of “**supply chain management, production control, equipment management, energy management, and HSE management**”, the six capabilities of “prediction, synergy, analysis, optimization, production control, and data obtaining” for production operations management, to achieve business objectives of “execution can be monitored, results can be analyzed, risks can be predicted and operations can be optimized”



Value of Digitalization: enhance energy efficiency

- ✓ Reduce consumption of materials and energy
- ✓ Maintain stable quality
- ✓ Enhance HSE
- ✓ Optimize overall performance
- ✓

4.4 Smart Chemicals: Digital Sinochem

Digital Sinochem under Construction...

Digital Sinochem



Smart Production

We deeply integrate digital technologies and the whole process of production, which goes through the whole life cycle of products, production and services, enhancing real-time monitoring level and equipment automatic control level, and finally realizing smart production.



Model Innovation

We focus on energy and chemical Internet, agricultural MAP and other innovative development strategies, builds an innovative business model that uses e-commerce as a carrier, integrates online and offline services, combines products and services, and utilizes interconnection.



Digital Operation

We support the Group to establish a scientific and efficient operation management system with 6S as the core, improve the efficiency and level of daily management, provide digital tools and data support for operation and management, and ensure the authority to “put down and managed”

Technology Support

Cloud Computing

Big Data

Internet of Things

Mobile Internet

Block Chain

Artificial intelligence



Sinochem Group explores the development path guided by the core value of “In Science We Trust”, and builds a world-class comprehensive chemical enterprise with international competitiveness based on wisdom, vision and ability.

Thank You !