



中糧
COFCO
自然之源 匯聚你我

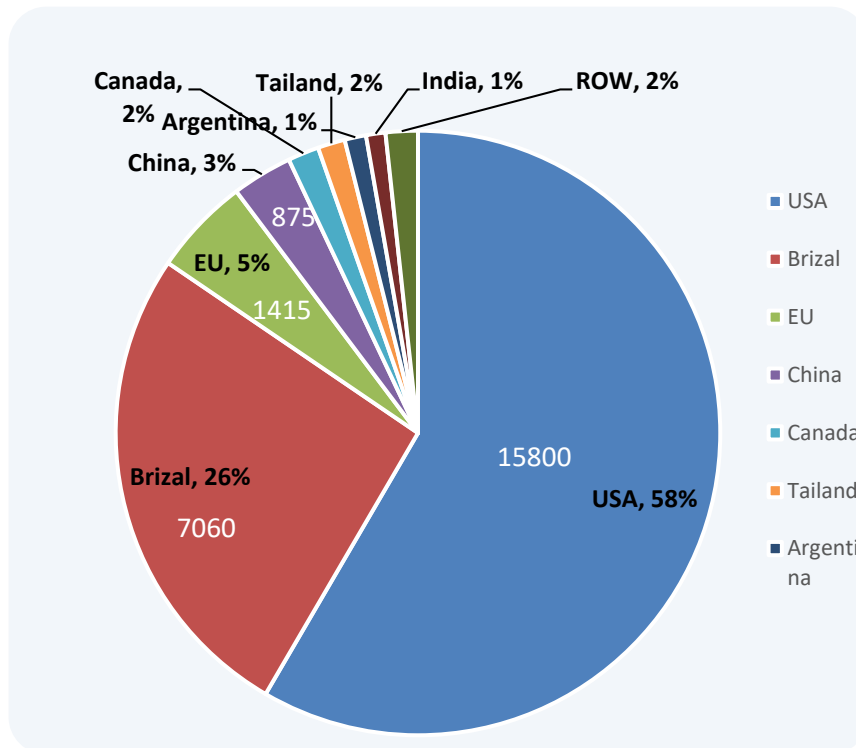
Fuel Ethanol Industry in China: Status and Brief Outlook



Apr 8, 2018

China is one of the most important country In fuel ethanol promotion

- **Fuel ethanol** is reproducible fuel, with similar function as petrol;
- Currently, more than ten countries/regions are implementing fuel ethanol, the USA, Brazil, EU and China are the top four.

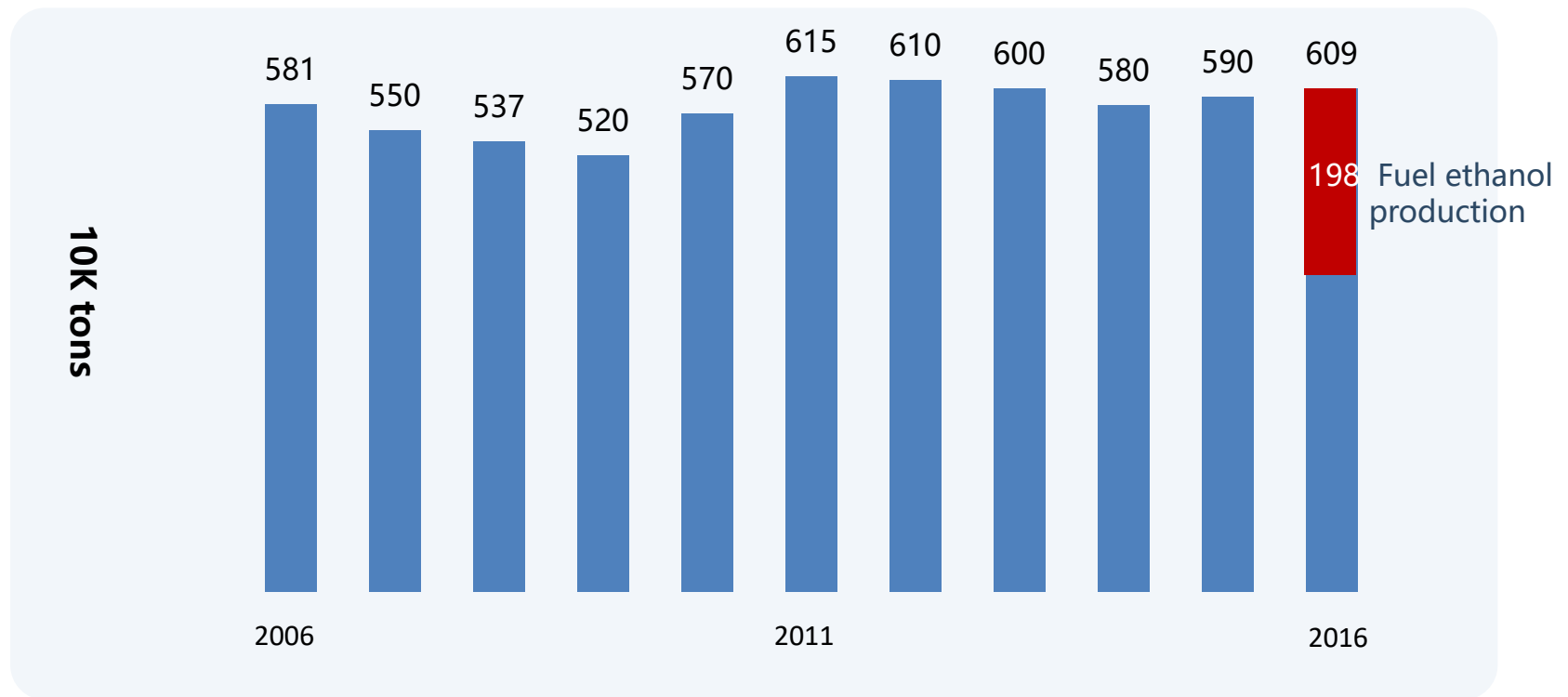


World Fuel Ethanol Production in 2017, in Million Gallons,
RFA statistics



Chinese ethanol industry is a foundation of fuel ethanol industry

- Annual production of Chinese ethanol industry: around 6 million tones.



As the market concentration of Chinese ethanol industry increased, the scale of single device increased

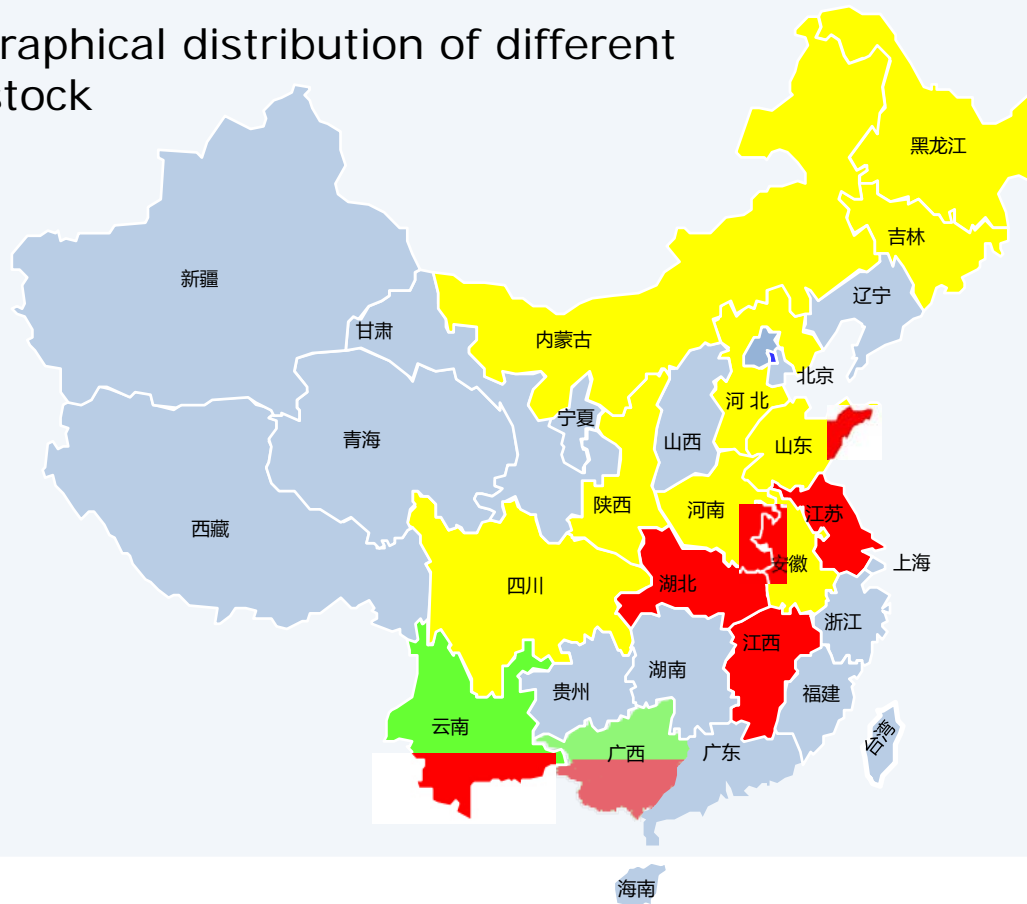
- Sum up ≥ 10 k tons capacity enterprise:s total capacity over 6million tons. Total production over 4million tons, accounting for 65% of the total production.

Rank	Enterprise	Capacity	production
1	COFCO BIO (3 plants)	120	110
2	Alcohol Group	100	70
3	Jilin Fuel	70	65
4	Henan Tianguan Ltd.	70	35
5	Jilin Xintianlong alcohol Ltd.	35	30 =100 MGY
6	Celanese Corporation	28	20
7	Yinshan hongzhan Ltd.	18	10
8	Jiangsu Huating alcohol Ltd.	20	10
9	Heilongjiang Shenglong alcohol Ltd.	20	10
10	Liaoyuan Jufeng Bio-tech Ltd.	25	10
11	Guangxi xintiande fuel Ltd.	12	10
12	Daqing borun bio-tech Ltd.	22	8
13	Henan mengzhou hoaxing alcohol Ltd.	15 =50 MGY	8
14	Jiangsu Lianyungang Dongcheng Alcohol	15	8
15	SDIC Guangdong Bio-energy CO., LTD	15	
16	Jinyimeng Group CO., LTD	10	8
17	Jinyuan Jiujiang	10	8
Total		605	420

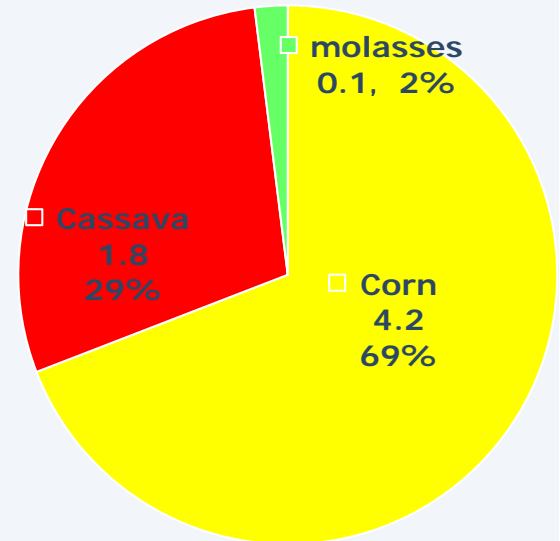
Diversified Feedstock Development

- The feedstock includes corn, cassava, molasses, old wheat and old rice.

Geographical distribution of different feedstock



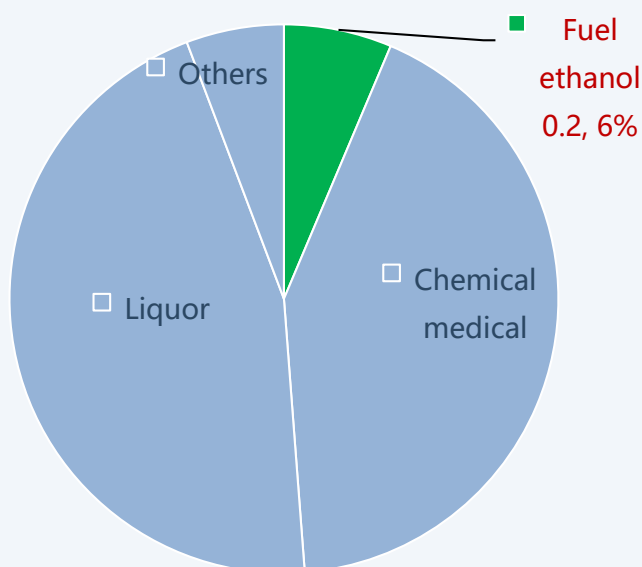
2016 feedstock for ethanol (million tons)



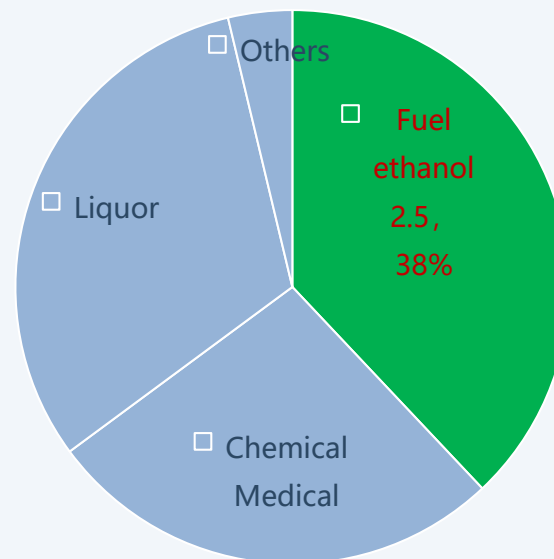
Ethanol consumption in China

- Ethanol consumption increases **3.4 million** tons from 2004 (3.3million tons) to 2016 (6.7million tons) in China.
- Fuel ethanol consumption increases **2.3million** tons from 2004 (0.2million tons) to 2016 (2.5million tons), accounting for an increase from 6% to 38% of the total ethanol consumption.

2004 China ethanol industry end use



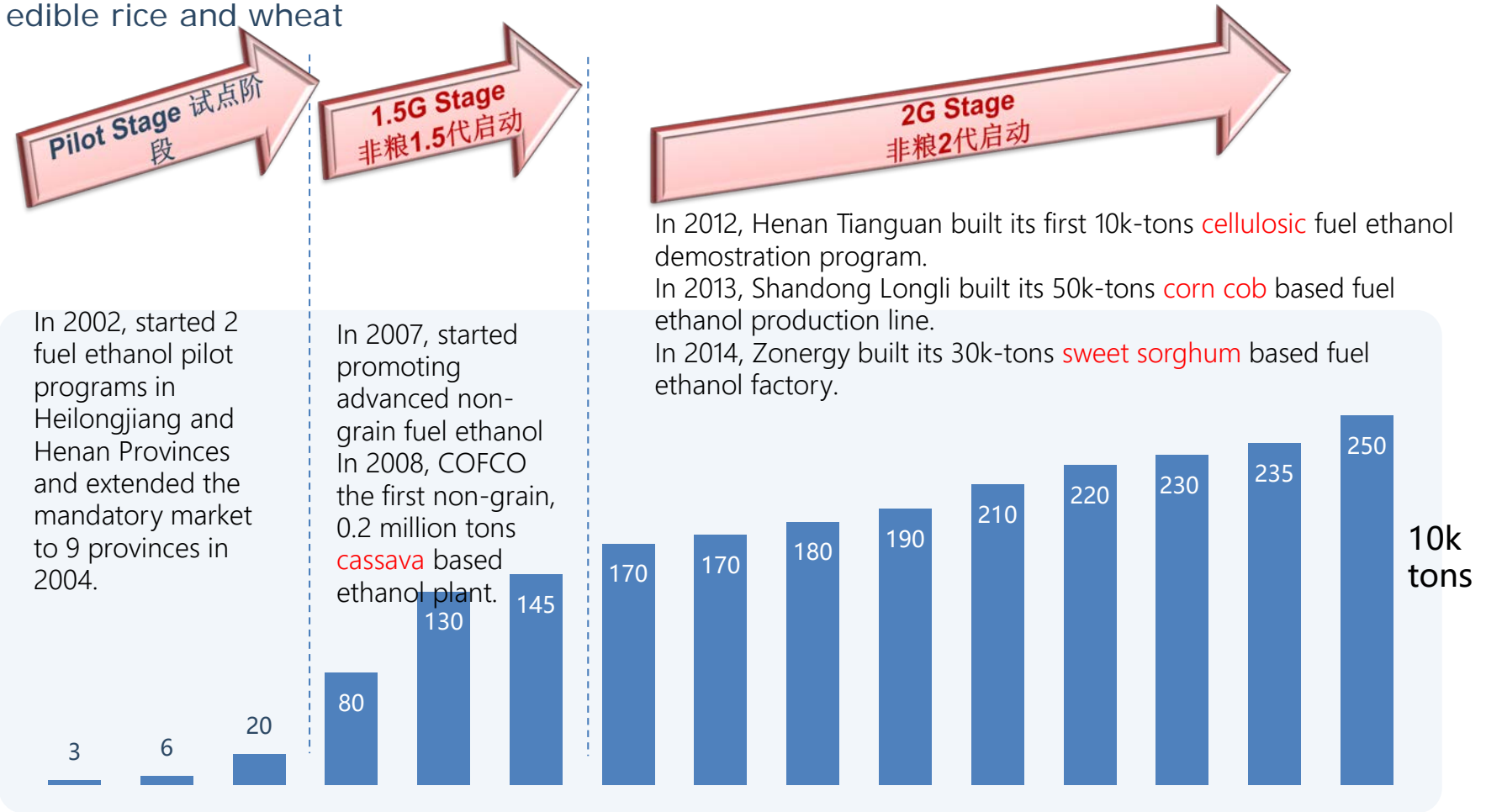
2016 China ethanol industry end use



Ps: the imported ethanol in 2014, 2015, 2016 are 20k tons, 54k tons and 60k tons.

China fuel ethanol production and development

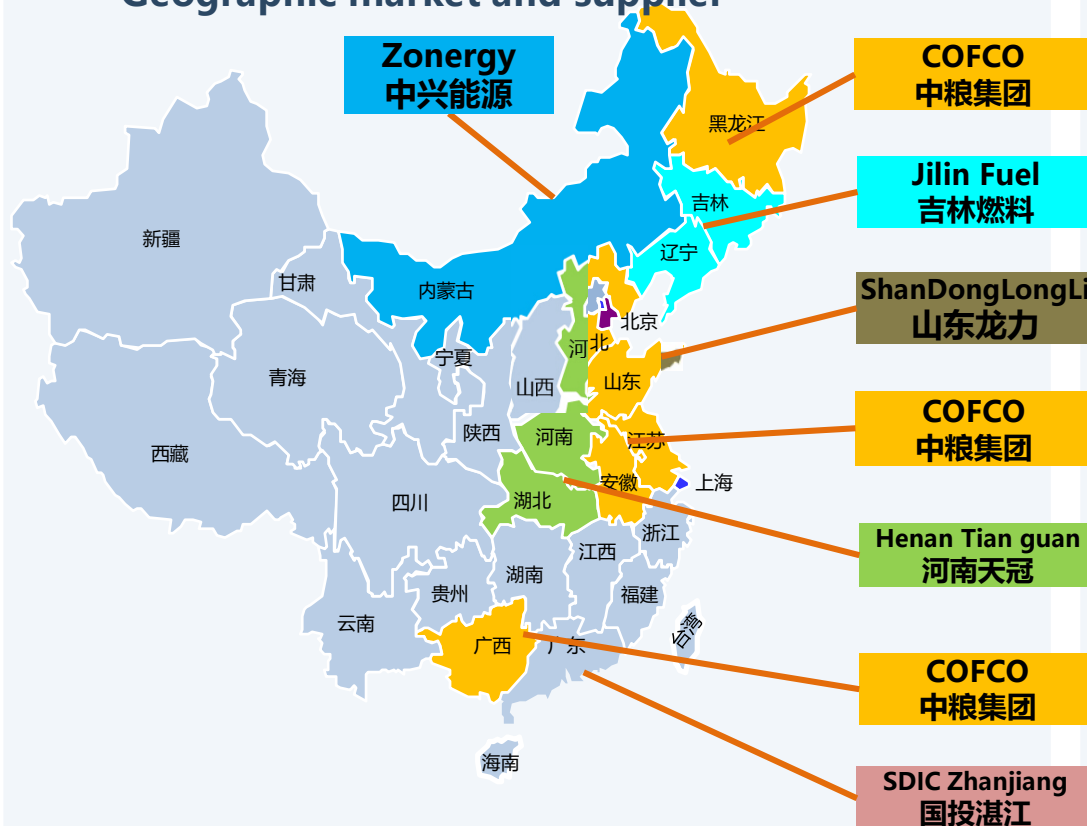
- 2002, the government started to develop fuel ethanol industry;
- 2016, annual consumption **around 2.5million tons**, feed stock include corn, cassava, non-edible rice and wheat



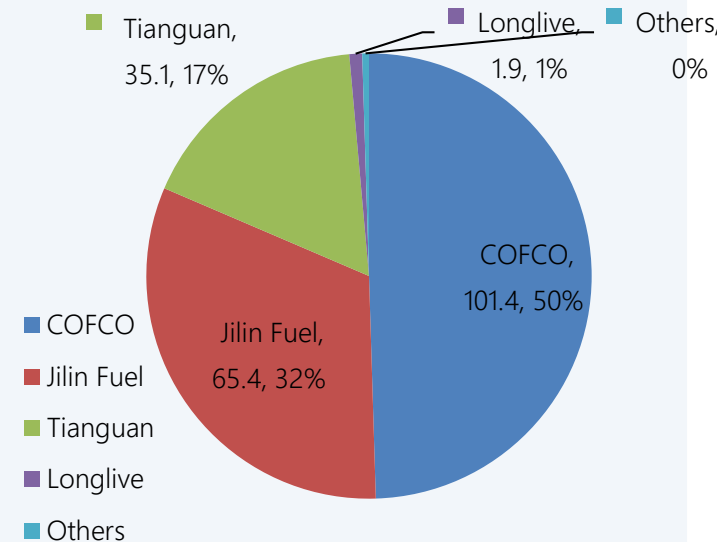
China fuel ethanol market and supplier

- 11 provinces are using E10 gasoline, COFCO got the largest market share in China.

Geographic market and supplier



Market share of fuel ethanol in 2016, in 10k tons



Policy develops and becomes mature, new opportunities increase

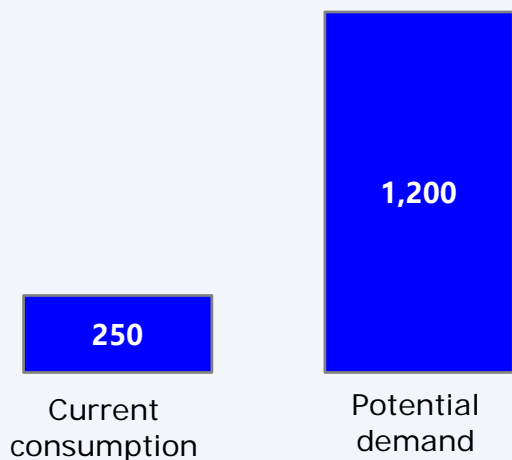
- China fuel ethanol industry policy: steady operation according to 'approved production, targeted circulation, closed operation, orderly development'
 - 2002, Vehicle ethanol gasoline pilot program, started pilot stage
 - 2004, Vehicle ethanol gasoline expand pilot program, pilot stage extended
 - 2005, Renewable Energy Law of China
 - 2014, Strategic action plan for energy development (2014-2020), vigorously develop non-grain ethanol.
 - 2016, 13th Five-Year plan for the development of biomass energy released
 - 2017, On the implementation of bio-ethanol production and promotion of the use of vehicle ethanol gasoline implementation plan. According to this plan, by 2020, China will basically achieve the full coverage of vehicle fuel ethanol. By 2025, achieve large-scale production of cellulosic ethanol, forming a more consummate market-oriented operation mechanism.

China fuel ethanol industry is about to surge

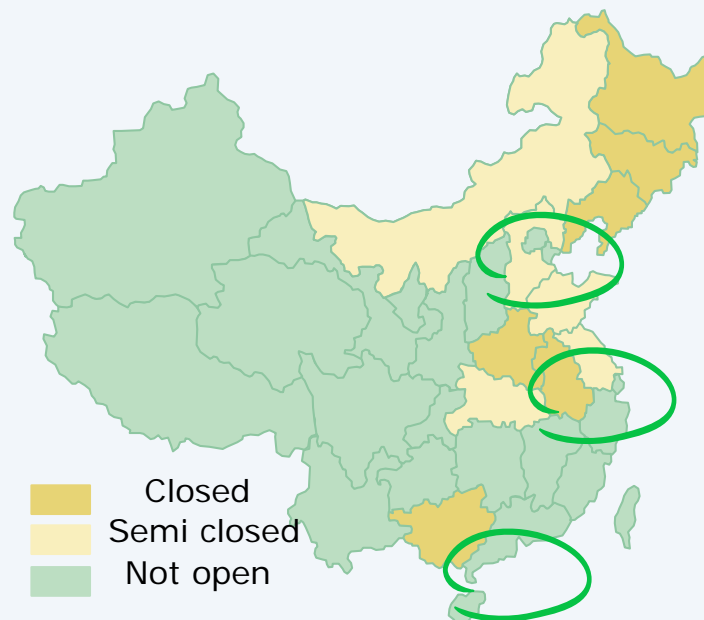
- Gasoline consumption in 2017 is 120 million tons
- Fuel ethanol demand gap: around 9.5 million tons per year
- Potential demand in developed area (1st tier cities) markets exceeds 7 million tons

Consumption vs Demand

10k tons per year

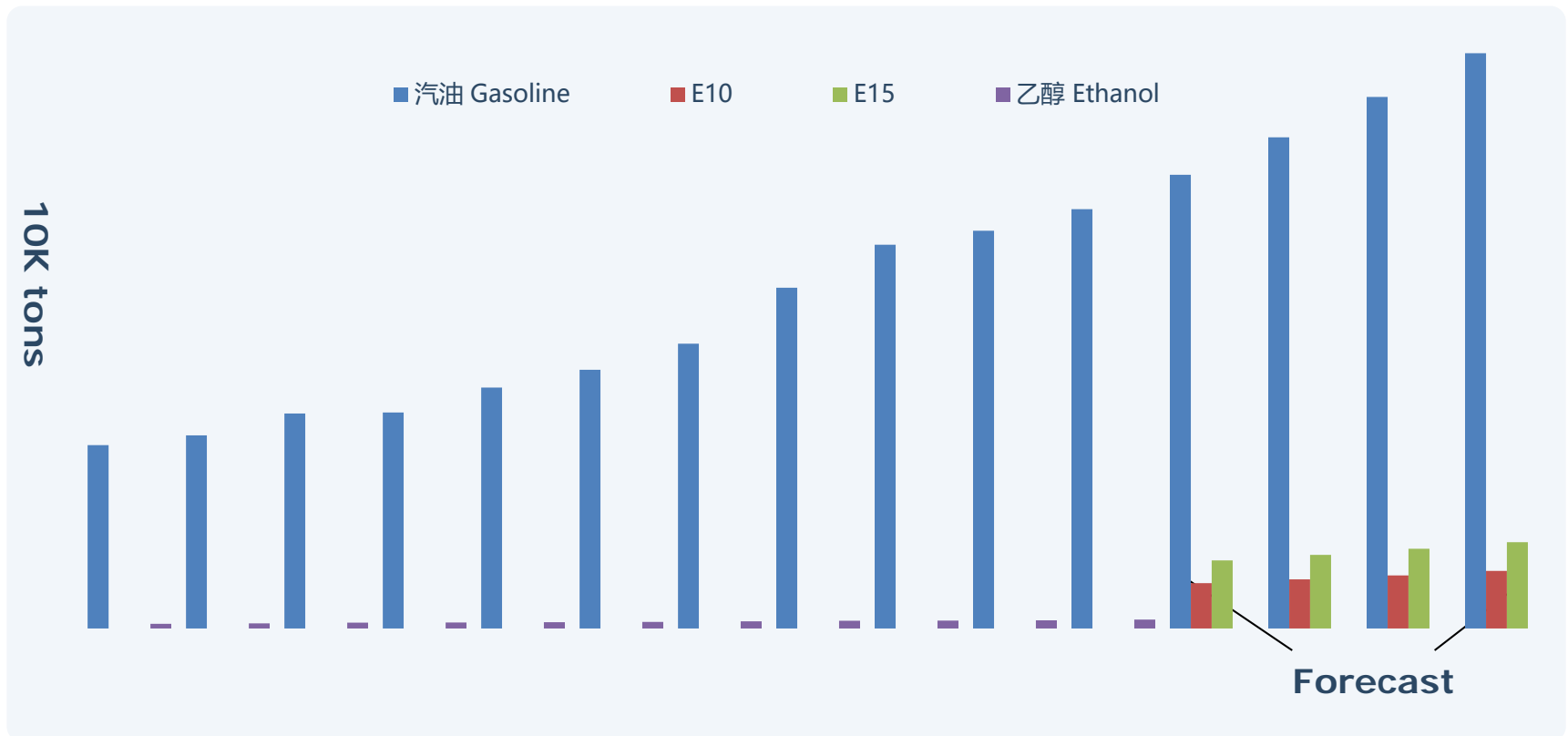


China fuel ethanol pilot area



With the increase of gasoline demand blending ratio, the demand of fuel ethanol will be **increased**

- 2020, if Chinese government implements the E10 standard, **>13 million tons** of fuel ethanol per year is needed;
- If under the E15 standard, **20 million tons** of fuel ethanol per year will be needed.



COFCO Biochemical is an important player in Chinese fuel ethanol industry

专业化公司（平台）在中粮的各个业务领域

Specialized companies(platforms) in COFCO business domain



COFCO R&D in Fuel ethanol

中粮营养健康研究院 **Biotechnology center**
COFCO Nutrition & Health Research Institute

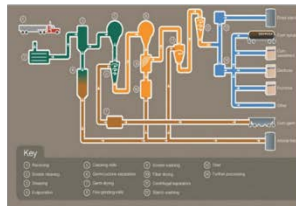


中粮生化
COFCO Biochemical

Process Engineering

Process simulation,
equipment
development, TEA,
PDP development

工艺集成



菌株开发 Strain development

bioinformatics,
genetic engineering,
microbiome, high
throughput screening
technology



Bioseperation

single column separation
model, continuous ion
exchange, simulated
moving bed, affinity
chromatography,
membrane separation

生物分离



生物转化 Bioconversion

high density fermentation,
enzymatic application,
fermentation optimization

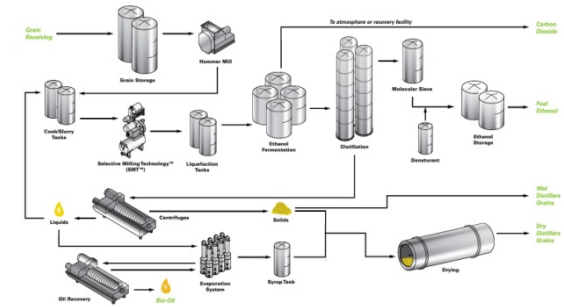


COFCO R&D in Fuel ethanol

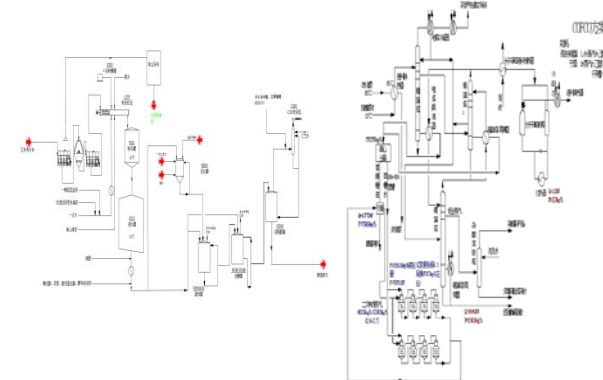
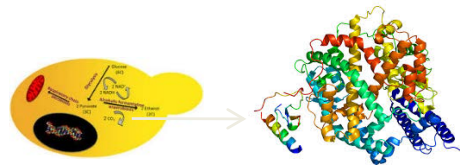
Feedstock, enzymes, strains,
nutrients

New technology
validation

PDP upgrade



AB MAURI
英联马利



COFCO R&D in Fuel ethanol

- Based on the existing cellulosic ethanol demonstration plant, COFCO will further explore the feasible route for the commercial production of cellulosic ethanol and launch the construction of 50k tons/y cellulosic ethanol plant.

Corn(Old rice) ethanol
(1st generation)

4 million tons

Cassava ethanol
(1.5 generation)

0.2 million tons

Cellulosic ethanol
(2nd generation)

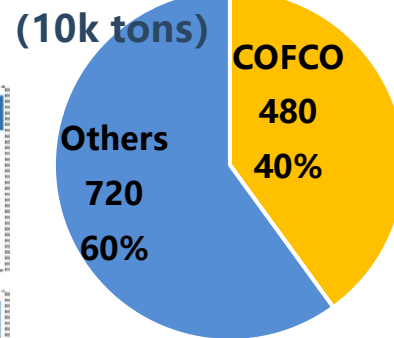
Several 50k tons
demonstration plant



Witness of Chinese fuel ethanol industry

- COFCO is **the largest** fuel ethanol producer, 3 wholly owned companies and one shared company
- COFCO is one of **the earliest** fuel ethanol producers in China, using corn, cassava, old rice as feedstocks.
- COFCO has 4 sugar mills in Brazil, co-produce 0.4 million tons of fuel ethanol(hydrous + anhydrous)

2020 China Fuel Ethanol Market Share Forecast (by COFCO)



Thank you!

