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Report Highlights:

Wavering and uncertain policies and prices continue to limit fuel ethanol consumption in China. In late 2020 the State Council called for controlling the expansion of fuel ethanol processing capacity. Only a few months later, in early 2021, the National Energy Administration (NEA) urged local governments and companies to support the development of biofuels. While President Xi made a commitment for China's carbon dioxide emissions to peak by 2030, there has been no mention of biofuels as part of meeting this goal. Post estimates China's 2021 actual blend rate at 2.1 percent, up slightly from 2020 but still well below the peak blend rate of 2.8 percent from ten years ago. China's 2021 biodiesel production is forecast at 1.7 billion liters, up by more than 54 percent from 2020 due to strong exports. Any progress on advanced biofuels production and expansion continues to lag.

Acronyms

Chinese Academy of Sciences (CAS)
Carbon Emission Footprint (CEF)
Carbon Emissions Trading System (ETS)
China Association of Automobile Manufacturers (CAAM)
China National Cereals, Oils and Foodstuffs Corporation (COFCO)
China National Offshore Oil Company (CNOOC)
China National Petroleum Corp (CNPC)
China National Petroleum Corp, publicly listed arm (PetroChina)
China National United Oil Corp, CNPC Trading-arm (Chinaoil)
China Petroleum and Chemical Corporation (Sinopec)
China Petroleum and Chemical Corporation, Trading-arm (Unipec)
Chinese People's Political Consultative Conference (CPPCC)
Dried Distiller's Grains with Solubles (DDGs)
Electric Vehicle (EV)
Ethyl Tert-Butyl Ether (ETBE)
Five-Year Plan (FYP)
General Administration of China Customs (GACC)
Greenhouse Gas (GHG)
Ministry of Ecology and Environment (MEE)
Ministry of Environmental Protection (MEP)
Ministry of Finance (MOF)
Ministry of Public Security (MPS)
National Development and Reform Commission (NDRC)
National Energy Administration (NEA)
National People's Congress (NPC)
New Energy Vehicles (NEV)
Particulate Matter (PM)
Renminbi (RMB)
State Council Tariff Committee (SCTC)
Used Cooking Oil (UCO)

I. Executive Summary:

China's biofuel program has always been driven primarily by plentifully available corn stocks and a means to reduce stocks - air quality and environmental climate change goals have always been secondary. As corn stocks were drawn down and high grain prices, coupled with low ethanol pricing, made corn-based ethanol unprofitable in late 2020, enforcement of China's E10 blending mandate waned.

President Xi made an international commitment to peak carbon dioxide emissions by 2030. While biofuels have the potential to be tool in reaching this goal, there have been no specific directives or mentions of biofuels related to this commitment. This is the latest illustration that China's biofuels policies are primarily driven by other policy goals beyond environmental concerns. The policy-driven directive made by the People's Republic of China's (PRC) top leader has also allowed the country's biofuels sector to be partially isolated from the global market and less responsive to market forces. Industry players continue to scrutinize government decisions and pricing with the draw down in corn reserves that began in 2018 through 2020 and higher domestic grain prices beginning in mid-2020.

In 2017, at the start of the most recent chapter in China's evolving fuel ethanol program that spans two decades and is one of the world's oldest, the PRC declared that it would establish a nationwide E10 mandate by the end of 2020. Industry members reported in late 2019 the PRC suspended efforts toward that goal. Since late 2019, fuel ethanol blending in pilot areas has declined. High corn prices pushed up the cost of fuel ethanol production while ethanol prices were held in check using a formula tied to gasoline prices, forcing the provinces and cities which had announced new 2020 E10 expansion plans in 2019 to scale back implementation. The PRC has reportedly delegated E10 blending goals and decision-making authority to provincial governments while having E10 pilot areas remain at the blending levels previously reached. Northern corn producing provinces slowed construction of new plants and abandoned plans for new construction, and southern provinces continued to import fuel ethanol when economic conditions allow. Industry contacts have shared rumors that the PRC may eventually move unofficially from the E10 to an E5 mandate in the coming years. Still, while the official policy remains a goal of E10, actual blend rates vary and are often significantly lower, and several provinces never established a program.

Fuel ethanol consumption in 2021 is estimated at 4.2 billion liters (3.3 million tons), up 377 million liters from 2020 due to tightened government supervision to support E10 mandate in existing pilot area. Production is forecast to decrease to 3.4 billion liters (2.7 million tons), down 380 million liters (0.3 million tons) from the previous year due to high feedstock prices. Fuel ethanol imports are forecast at 800 million liters (600,000 tons), mostly from the United States. With lower domestic production due to high feedstock prices, China will have to rely on imports to meet domestic market demand in 2021 even without a strong E10 blend mandate.

The exports of used cooking oil (UCO)-based biodiesel saw a burgeoning increase in the first half of 2021, as robust demand from the European Union (EU) enabled Chinese biodiesel producers to increase production¹. China's fatty acid methyl esters (FAME) biodiesel producers have relatively stable production capacity at 2.5 billion liters (2.2 million tons) per year. Export-oriented hydrogenation-derived renewable diesel (HDRD) plants saw notable expansion in the last two years, with a combined capacity of more than 1.3 billion liters (1.15 million tons) per year and an additional 1.3 billion liters (1.15 million tons) per year capacity planned. Since there has never been a biodiesel blend mandate at the national or provincial level, demand for domestic use and imports is

¹Due to uncertainty in HS codes used for HDRD, it is possible some product traded under the biodiesel code in Chapter 38 could be HDRD that should be reported in Chapter 27.

discretionary (expect for one city mandate) and thus impacted by diesel prices. Lacking any significant support, plants remain small with localized and limited sales. Post estimates a 0.2 percent domestic biodiesel blend rate in 2021, like the previous two years; there has been no appreciable change since biodiesel emerged two decades ago.

II. Policy and Programs

Biofuels are part of China's long-run strategic plan to protect the environment, conserve resources, and reduce dependence on imported energy. However, ethanol is the only biofuel receiving attention from China's policy makers with ambitious emissions targets and policies. China's ethanol programs also support several national initiatives to manage air pollution. Support for biodiesel (mandates, producer subsidies, and pricing policy) which lowers air toxins compared to fossil diesel remains noticeably absent and is left out of the policy conversation. Sustainable Aviation fuel (SAF) is still in its infancy in China and there have yet to be serious conversations around policies to support it. For more details, see GAIN reports [CH19047](#) and [CH2020-0105](#).

Renewable Energy and Greenhouse Gas (GHG) Emissions

Carbon Peak before 2030

At the Climate Ambition Summit in December 2020, President Xi committed China to lower its carbon dioxide emissions per unit of GDP by over 65 percent from its 2005 level and will increase the share of non-fossil fuels in primary energy consumption to 25 percent by 2030. These targets are a means for the PRC to meet the goal of peak carbon dioxide emissions by 2030.

Additionally, China launched an emissions trading system (ETS) on July 16, 2021. Carbon emissions by companies covered in the first batch of trading are estimated to exceed 4 billion tons per year, or roughly 12 percent of global CO₂ emissions, making the market the world's largest in terms of the amount of greenhouse gas emissions.

The outline of the 14th FYP for Economic and Social Development (2021-2025), published in March 2021, sets an economy wide 18 percent reduction target for "CO₂ intensity" and 13.5 percent reduction target for "energy intensity" from 2021 to 2025. The Plan requires "strengthening the management of urban air quality compliance, promote coordinated control of fine particulate matter (PM 2.5) and ozone (O₃), reduce the PM_{2.5} concentration of cities at prefecture-level and above by 10 percent, effectively curb the increasing trend of O₃ concentration" and "basically eliminate heavily polluted weather", which researchers estimate it will require a 70–80 percent reduction in pollution emissions in northern China by 2025. The degree to which the use of fuel ethanol and biodiesel will be used to advance these objectives remains unclear.

For information on China's Energy Development Strategy Action Plan published in November 2015, the Blue Sky Protection Plan issued in July 2018 and China's Vehicle Emissions Standards, please see the [2020 Biofuels Report](#).

Fuel Ethanol Policy Framework and Mandates

Chinese law restricts fuel ethanol processing to licensed facilities that produce and supply fuel ethanol to national refiners and fuel marketing companies. Provincial Development and Reform Commissions (DRCs) are responsible for the distribution of licenses for fuel production, refining, and marketing. (See Section III. Ethanol Production). It was forecast that the original plans to reach E10 in 2017 and 2018 would result in a fuel ethanol supply gap of more than 14 billion liters below China's E10 target in 2020.

E10 Production Estimate for 2021

Impacted by policy change and rising feedstock prices, China is projected to produce 3.4 billion liters (2.7 million tons) of fuel ethanol and consume 4.2 billion liters (3.3 million tons) of fuel ethanol in 2021, slightly lower than the 2019 consumption level. The production and demand gap is expected to be filled with imports estimated to reach 800 million liters (0.6 million tons). If China had fully implemented a national E10 blending program by 2020 as originally planned, the IEA and China's National Energy Administration both projected that China would consume about 19 billion liters (15 million tons) of fuel ethanol in 2020, or five times greater than 2018 consumption (3 million tons). The International Energy Agency's (IEA) March 2021 estimate for China's 2020 fuel pool of 196.75 billion liters returns a very similar E10 ethanol requirement of 20 billion liters (rounded). Even if all of China's existing approved fuel ethanol projects begin operation in 2021, the total output would only reach no more than E4, assuming China's corn stocks could support this expansion and remain stable over the longer term. Officials have reportedly decided not to expand corn ethanol plant capacity beyond the 2019 level. There is no E10 nationwide goal currently.

The pandemic and corresponding drop in gasoline prices shifted ethanol demand as well. Low gasoline prices made ethanol imports nonviable for portions of the year but then surged with the demand for disinfectant use. The Chinese government did not enact any specific policies or supports during this time to help the ethanol industry, another indicator of government priorities.

In June 2020, NEA published a guide on energy work in June 2020, there is only one mention of fuel ethanol, where NEA calls for "perfect fuel ethanol policy system, appropriately expand the production of biofuel ethanol and the promotion and usage of ethanol gasoline for car use." No further information or goals are stated. In September 2020, NEA published a Guideline on Cancelling and Decentralizing Administrative Approval Items and Enhance Follow-up Supervision. It says the NEA will publish biofuel industry policies and planning documents, clarify fuel ethanol development's objectives and layout arrangements. The NEA will enhance supervision on the project approvals submitted by local governments to NEA based on the overall control, industry policy and key arrangements as required in the Guideline. NEA gradually delegated the approval power to local governments over the past years. That led to an increase in fuel ethanol plant construction in some provinces. The NEA now believes they need to strengthen coordination of fuel ethanol supply and transportation, and corn destocking.

In December 2020, the State Council issued the white paper "China's Energy Development in the New Era", requiring strict control of the expansion of fuel ethanol processing capacity. At the same time, NEA reminded oil and gas companies that they should understand that promoting ethanol-gasoline was a clear strategic objective of the Chinese government, that they should "adhere to the policy direction", and they should "restore supply of ethanol-gasoline as soon as possible and maintain the order of the refined oil market" (after learning some had stopped selling the fuel in parts of the country).

In February 2021, NEA announced the "[Key Tasks for Energy Regulation in 2021](#)", requiring support for the development of liquid biofuel, regulating ethanol gasoline promotion, and urging gasoline sales companies to sell liquid biofuel in accordance with rules. The changing policies show that the original nationwide promotion of E10 ethanol gasoline will be shifted to be a step-by-step transition plan. As such, industry sources expect China will 1) focus on keeping the existing provinces and municipalities that have fully or partially adopted E10 ethanol gasoline at current levels and 2) postpone its national E10 plan by extending the E10 mandate to other areas in batches.

China's ambitious E10 plan never had viability and at this stage will never truly be adopted though the goals and policies may stay on the books.

Phased Adoption and Actual Implementation of E10 Varies by City and Province

Since 2006, China has expanded in a piecemeal fashion the number of cities and provinces adopting E10 blending mandates. Actual rates of fuel ethanol blended into gasoline supplies, reportedly, varies city-by-city and province-by-province and has often fallen below the local mandate due to varying levels of enforcement. The level of implementation often reflects the volume of fuel ethanol produced in each region which can vary depending on corn and oil (gasoline) prices and availability of feedstocks.

For more historical information on blend mandates, please see the [2020 Biofuels Report](#).

Government Financial Support for Ethanol Production

Past PRC government subsidies for fuel ethanol production supported both feedstocks and production inputs to make the industry viable. Starting in 2009, central government production subsidies for grain-based conventional ethanol were as high as \$0.25/liter but were eliminated in 2016. From 2016 to 2018, provinces in Northeast China offered corn processors and ethanol facilities generous subsidies (See GAIN report [CH9059](#) and Annex 1). But provincial authorities have not renewed processing subsidies since 2019 as government commitment to supporting the biofuels industry has waned with corn stocks depleted (See GAIN report [CH16058](#)). The advanced cellulosic ethanol production subsidy was set at is \$0.07 per liter (600 RMB per ton) in 2018 and there have been no additional announcements or updates to the original subsidy program. This is unlikely to change anytime soon unless concerns over feedstock supply reverse.

On June 23, 2020, NDRC and MOFCOM jointly released the 2020 Catalogue of Encouraged Foreign Investment in Industries, which includes fuel ethanol development and production. However, the catalogue specifically discourages foreign investment into grain-based ethanol production. This is a further signal that further investments in expanding China's corn (other grain) based ethanol production capacity in the short to near-term is unlikely.

Import Tariffs

On December 19, 2016, the State Council Tariff Committee (SCCTC) released the 2017 Tariff Adjustment Plan, which adjusts applied tariff rates in 2017.

Denatured Ethanol (HS 220720)

On January 1, 2017, the tentative tariff rate for denatured ethanol (HS 22072000) rose from 5 percent to the World Trade Organization (WTO) Most-Favored Nation (MFN) bound rate of 30 percent. Subsequently,

- On April 2, 2018, China levied an additional 15-percent tariff on U.S.-origin denatured ethanol in response to the U.S. 232 Action, raising the tariff from 30 percent to 45 percent.
- On July 6, 2018, China imposed an additional 25-percent tariff on imports of U.S. denatured ethanol in response to the U.S. 301 Action, raising the effective tariff to 70 percent. (See GAIN reports [CH18017](#) and [CH18018](#)).

Undenatured Ethanol (HS 220710)

MFN tariff rates on undenatured ethanol were raised to 40 percent on January 1, 2017. On August 3, 2018, MOFCOM announced an additional tariff on U.S.-origin undenatured ethanol, raising the tariff by 25 percent from 40 to 65 percent. (See GAIN report [CH18047](#)).

Table 1. China: Import Tariffs on Ethanol

HS Code		MFN	232	301
22072000	Ethyl Alcohol & Other Spirits, Denatured of Any Strength	30%	15%	25%
22071000	Undenatured Ethyl Alcohol, Of Alcohol V. \geq 80%	40%		25%

On February 18, 2020, China announced a new round of tariff exclusions for U.S. agricultural commodities impacted by the retaliatory Section 301-tariffs levied by China. Denatured ethanol (HS Code: 22072000) is included in the list with the announcement effectively lowering the duty on U.S. fuel ethanol from 70 percent back to 45 percent for those importers who apply for the exclusion. Tariff exclusions are approved for individual importers and will not automatically extend to all importers. Undenatured ethanol (HS Code: 22071000) is not on the list, but eligible importers can also apply for an exclusion for this product. The application process through China's Ministry of Finance (MOF) website opened on March 2, 2020. See FAS-Beijing's February 26, 2020, report "[China Announces a New Round of Tariff Exclusions](#)" for more information.

Biodiesel and Petroleum Oils Containing Biodiesel (HS382600 and HS27102000)

On August 23, 2018, China imposed an additional 25-percent tariff on U.S.-origin petroleum oils containing 1 to 30 percent biodiesel (HS27102000, Petroleum oils containing up to 30 percent biodiesel by volume), which effectively raised the tariff from 6 percent to 31 percent. At the same time, the duty for U.S. origin petroleum contaminating 30 to 100 percent biodiesel was raised from 6.5 to 31.5 percent (HS38260000). See GAIN report [CH18034](#).

III. Ethanol

Overview

China is the world's fourth largest fuel ethanol producer after the United States, Brazil, and the EU and is expected to fall to fifth position for consumption in 2020 owing to reported growth in Canada. China's fuel ethanol market has remained mostly insular throughout its 20-year history. Imports were effectively banned until 2015 and China has never produced an exportable surplus. Since additional duties on U.S.-origin imports were implemented in early 2018, China's fuel ethanol market retreated from the global market as the United States was historically the sole supplier of fuel ethanol to China.

China produces a broad variety of ethanol products at the commercial scale covering potable alcohol, medical grade, other industrial chemicals, as well as fuel ethanol. Unlike other major ethanol producing countries, China's major end use market is non-fuel industrial chemicals and rather than fuel ethanol.

Fuel Ethanol Consumption

In 2021, fuel ethanol consumption is estimated at 4.2 billion liters (3.3 million tons), up 377 million liters from 2020 resulting in a 2021 national average fuel ethanol blend rate estimated at 2.1 percent, slightly higher than 2020, but significantly lower than the 2.8 percent peak blend rate of 2.8 percent achieved 10 years ago. This is in part attributed to increased scrutiny this year from the national government on localities with existing E10 pilots to meet the full blend mandate up to E10 even though expansion of E10 has been unofficially suspended.

Wavering and uncertain policies and prices limit fuel ethanol consumption. On the one hand, the State Council in late 2020 called for controlling the expansion of fuel ethanol processing capacity while on the other, the NEA in early 2021 urged local governments and companies to support the development of liquid biofuels, worked to regulate ethanol gasoline promotion, and urged gasoline sales companies to sell liquid biofuel in line with existing

regulations. These guidelines from both the State Council and NEA will only have a nominal effect on biofuel consumption this year and not enough to have any effect on meeting previously supported ambitious targets.

Note: China does not produce ethanol-containing bio-ETBE (ethyl tert-butyl ether) in commercial volumes. Fuel blending formulations incorporating ETBE require additional processing, which have not been adopted in China. Fossil-based MTBE is the alternative oxygenate used across much of China, as well as limited distribution of methanol which remains localized.

Fuel Ethanol Production

China's 2021 fuel ethanol production is forecast to decrease to 3.4 billion liters (2.7 million tons), down 380 million liters (0.3 million tons) from the previous year. Fuel ethanol prices are fixed at 91.1 percent of the retail gasoline price, which is set by NDRC according to a basket of global benchmark crude prices. As crude oil prices rebounded to break \$60 per barrel in the first half of 2021, the international oil price returned to levels in place at the beginning of 2020. Although Chinese fuel ethanol prices have risen with gasoline, corn prices increased by more than 50 percent in the past year. The theoretical production profitability dropped even further to negative U.S. \$110 (- RMB 716) per ton in the first half of 2021 from negative U.S. \$91 (- RMB 590) per ton during the same period in 2020. Fuel ethanol plants have turned to old stock paddy rice as feedstock to protect margins. The fuel ethanol plant operational rate is estimated to drop to 42 percent in 2021, 15 percent lower compared to the previous year. However, with increasing international/domestic gasoline prices and the recent trend of decreasing domestic corn prices, fuel ethanol profitability has some potential to improve in the second half of 2021.

Even though the plants are running at negative or near negative margins, industry sources report two additional facilities could begin production this year in addition to facilities previously approved. This would bring about 760 million liters (600,000 tons) of capacity into production in 2021, raising the number of China's licensed bio-based fuel ethanol processors to 22, and total production capacity to 7.7 billion liters (6.1 million tons).

Industry sources report that China's fuel ethanol production was over 80 percent grain-based in 2021 and 10 percent cassava or sugarcane-based. From 2018 to 2020, essentially all fuel ethanol expansion was attributed to higher production from China's 8 major corn-based ethanol production facilities. Ethanol was transported to consumption areas via trucks (87 percent), boat (8 percent) and rail (5 percent).

Over the past year, only two new ethanol production facilities came into production. Hongzhan's 300,000-ton capacity project started trial production in May 2021. SDIC (Jidong)'s 300,000-ton capacity fuel ethanol project began to procure corn at the end of 2020 but to date, there is still no further news about when full production may begin. Once operational, the plant could consume up to 1 million tons of corn and produce 272,000 tons of DDGs each year.

Industry sources report that sugar and molasses- ethanol producers continue to struggle due to limited supplies of sugarcane and record high molasses prices as production margins are too low. Cassava ethanol (for fuel and other industrial use as a whole) production capacity is forecast to increase by 75,000 tons to 2.82 MMT in 2021, mainly in Shandong, Anhui, and Jiangsu, because of relatively low cassava prices compared with corn. China's cassava imports are projected to increase by 60 percent this year but imported raw cassava prices have continued to rise and shipping fees almost doubled, which may limit production in the second half of 2021.

Synthetic ethanol production will remain unchanged in 2021. In September 2020, a project signing ceremony was held for the first syngas-based fuel ethanol plant in Guizhou. Once operational, the plant is expected to produce 76 million liters (60,000 tons) of fuel ethanol per year.

Table 2. China: Ethanol Production, Supply, and Distribution

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)										
Calendar Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021f
Beginning Stocks		0	0	0	0	0	0	0	0	0
Fuel Begin Stocks		0	0	0	0	0	0	0	0	0
Production	5,286	5,795	6,921	7,868	8,071	9,211	9,770	10,740	10,830	10,580
Fuel Production	2,858	2,934	2,951	2,914	2,534	3,041	2,914	4,339	3,801	3,421
>of which fossil-based synthetic	0	0	0	0	0	0	0	0	30	30
>of which biobased	2,858	2,934	2,951	2,914	2,534	3,041	2,914	4,339	3,771	3,264
>of which biobased cellulosic	0	25	25	38	40	30	20	0	0	0
Imports	15	0	27	687	890	24	1,035	104	69	1,000
Fuel Imports	3	0	26	477	871	8	759	0	63	800
Exports	45	40	33	25	34	135	79	21	367	27
Fuel Exports	7	2	2	0	1	3	35	7	21	1
Consumption	5,256	5,755	6,915	8,530	8,927	9,100	10,726	10,823	10,532	11,553
Fuel Consumption	2,854	2,932	2,975	3,391	3,404	3,046	3,638	4,332	3,843	4,220
Ending Stocks										
Fuel Ending Stocks										
Total BalanceCheck	0	0	0	0	0	0	0	0	0	0
Fuel BalanceCheck	0	0	0	0	0	0	0	0	0	0
Refineries Producing First Generation, Bio-based Fuel Ethanol (Million Liters) 1/										
Number of Refineries	6	6	7	7	10	11	12	14	20	22
Nameplate Capacity	3,000	3,000	3,200	3,200	3,600	4,200	5,000	5,257	6,578	7,720
Capacity Use (%)	95%	97%	91%	90%	69%	72%	58%	83%	57%	42%
Refineries Producing Cellulosic Fuel Ethanol (Million Liters) 2/										
Number of Refineries	1	1	3	3	1	1	1	1	1	1
Nameplate Capacity	13	13	129	129	65	65	65	65	65	65
Capacity Use (%)	0%	192%	19%	29%	62%	46%	31%	0%	0%	0%
Co-product Production (1,000 MT)										
DDGs	2,102	2,107	2,121	2,003	1,628	1,315	1,299	2,796	2,436	2,193
Feedstock Use for Fuel Ethanol (1,000 MT)										
Corn Kernals	6,717	6,732	6,775	6,400	5,200	4,200	3,650	6,763	5,426	4,070
Rice Kernals							500	2,170	2,357	2,938
Cassava (dried chips)	1,177	1,514	1,514	1,562	1,652	2,868	2,748	1,303	1,132	980
Wheat	na	na	na	na	na	1,000	1,000	552	480	166
Fossil Fuels/Waste Gas	na									
Market Penetration (Million Liters)										
Fuel Ethanol Use	2,854	2,932	2,975	3,391	3,404	3,046	3,638	4,332	3,843	4,220
Gasoline Pool 3/	113,592	130,019	135,837	157,487	164,506	170,479	180,570	189,928	196,749	203,460
Blend Rate (%)	2.5%	2.3%	2.2%	2.2%	2.1%	1.8%	2.0%	2.3%	2.0%	2.1%

Notes: f = forecast

Corn kernals: 1 MT = 402 (before 2014) to 417 liters (after 2014)

Rice: 1 MT = 400 liters

Wheat kernals: 1 MT = 393 liters

Sorghum (Sweet) 1 MT = 430 (used in 2014 Baseline)

Cassava (fresh root): 1 MT = 143 to 150 liters (25 to 35% starch content)

Cassava (dried chips): 1 MT = 333 to 400 liters (15 to 65% starch content)

Sources: Post estimates and industry sources

Production Capacity of China's Fuel Ethanol Licensed producers (2021 estimates)

	Producers	Production Capacity	Feedstock
1	SDIC Jilin Alcohol	887 million liters (700,000 tons)	Corn
2	Henan Tianguan	887 million liters (700,000 tons)	Wheat, Corn, Cassava
3	COFCO Biochemical (Anhui)	798 million liters (630,000 tons)	Corn, Cassava
4	COFCO Bioenergy (Zhaodong)	507 million liters (400,000 tons)	Corn
5	SDIC (Zhanjiang)	190 million liters (150,000 tons)	Cassava
6	Shandong Longlive	65 million liters (51,300 tons)	Corn Cob
7	COFCO Bioenergy (Guangxi)	253 million liters (200,000 tons)	Cassava
8	Zonergy (Inner Mongolia)	38 million liters (30,000 tons)	Sweet Sorghum
9	SDIC (Tieling)	380 million liters (300,000 tons)	Corn
10	Liaoyuan Jufeng Biochemical	380 million liters (300,000 tons)	Corn
11	Jilin Boda Biochemistry	507 million liters (400,000 tons)	Corn
12	Jiangsu Lianhai Biotechnology	152 million liters (120,000 tons)	Corn
13	Shandong Fu'en Biochemical	152 million liters (120,000 tons)	Cassava
14	Jiangxi Yufan	127 million liters (100,000 tons)	Cassava
15	Shougang Lanza Tech	58 million liters (46,000 tons)	Synthetic Gas
16	SDIC (Hailun)	380 million liters (300,000 tons)	Corn
17	Wanli Runda (Baoqing)	380 million liters (300,000 tons)	Corn
18	Hongzhan (Nehe)	380 million liters (300,000 tons)	Corn
19	Hongzhan (Huanan)	380 million liters (300,000 tons)	Corn
20	Ningxia Shougang Lanza Jiyuan	57 million liters (45,000 tons)	Synthetic Gas
21	Hongzhan (Bayan)	380 million liters (300,000 tons)	Corn
22	SDIC (Jidong)	380 million liters (300,000 tons)	Corn
	TOTAL	7,720 million liters (6.1 million tons)	
Source: Industry Sources			

Trade

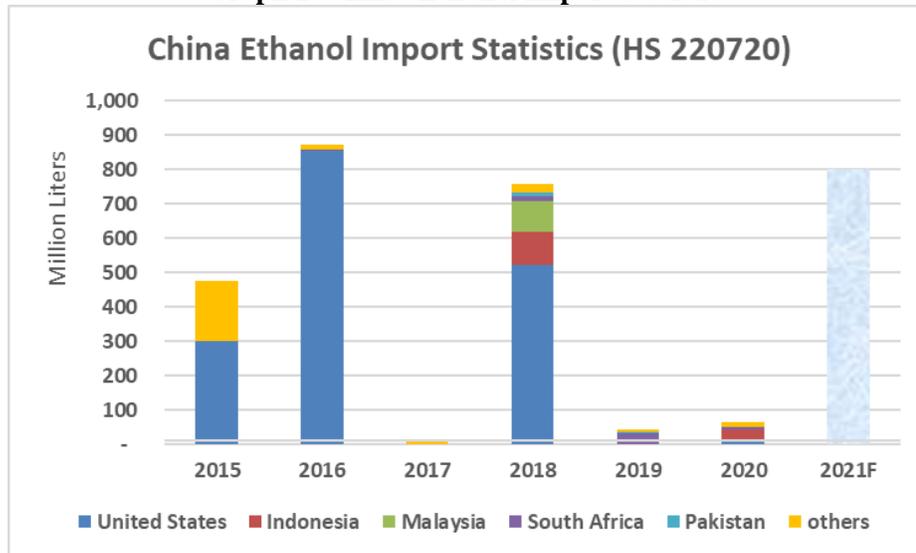
China's 2021 fuel ethanol imports are forecast at 800 million liters (600,000 tons), almost entirely from the United States. With domestic production falling, China will have to continue to rely on imports to meet domestic market demand for the remainder of this year. From January to May 2021, trade data indicates China imported 318 million liters (250,995 tons) of denatured ethanol, 225 million liters of which are reported as direct imports from the United States. China's 2021 fuel and other industrial chemical ethanol exports are forecast at 1 million liters. In the first five months of 2021, China already exported 523,450 liters of denatured ethanol predominantly to Japan and Taiwan.

Looking at the recent history of China's denatured ethanol (220720) imports, Post notes the following:

Nearly all the imports originate from the United States since 2016 and were used as fuel ethanol. China first allowed some test shipments of U.S. fuel quality ethanol in 2015 which turned into commercial trade in 2016 at the prevailing applied MFN duty rate of 5 percent. Starting January 1, 2017, China increased tariffs on all fuel (denatured) ethanol to the WTO MFN bound rate of 30 percent and trade was shut off from January to October 2017. Trade resumed in November 2017 as U.S. ethanol prices reached a 12-year low and continued through March 2018. Retaliatory tariffs on U.S. fuel ethanol were imposed in April 2018 which raised the duty to 45 percent and choked off all trade. Three months later, duties on U.S. products were raised further to 70 percent. In the second half of 2018, media reports chronicled how Malaysia and Indonesia shipped an estimated 100 to 150 million tons of ethanol to China, taking advantage of duty-free market access for ASEAN ethanol exports to China. After two years, Chinese fuel ethanol imports from the United States picked up in late 2020 when U.S. ethanol prices fell to their lowest level in years. The purchases were all price-based on sporadic openings in the

arbitrage window. However, the PRC’s political will and endorsement is necessary to see significant purchases of U.S. ethanol, regardless of tariff level. The PRC also reportedly waived import tariffs for an unknown volume of U.S. ethanol in 2021. Industry members believe the tariff waiver appears to a limited action and not a significant development for U.S. exports.

Graph 1. China: Ethanol Import Statistics



Sources: Trade Data Monitor, General Administration of China Customs, and FAS China estimates
 Note: News reports indicate that shipment from Indonesia and Malaysia in 2018 were US-origin product.

IV. Biodiesel

Overview

The PRC’s commitment to peak carbon emissions is driving and creating new prospects for expanded biodiesel use and production in China where there previously was little will to mandate or provide any other support other than attempting to ban reuse of used cooking oil repeatedly in food preparation. Based on fuel use, a modest B5 mandate for on-road use alone would currently require 7.05 billion liters of B100 biodiesel (See the Biodiesel Table below). Beyond that, the potential is greater still, as China’s biodiesel applications also include off-road maritime and other non-transport sectors. However, suffering from inadequate policy support, nationwide consumption remains very limited ranging from 500 million liters to 2.1 billion liters over the past decade supported only thru discretionary demand.

With limited and ineffective tax breaks (insufficient to build the market alone) and seemingly no prospects for other financial incentives or blending mandates or carbon market that penalizes the higher carbon content of fossil diesel as measured by LCA, and limited by UCO which is the only large volume feedstock domestically available and requires a new supply chain to support supply, China’s biodiesel market will remain extremely limited and unable to compete with typically lower priced diesel. China’s periodic expansions in biodiesel production, imports, and consumption followed by collapses highlight periods of discretionary (non-mandate driven) demand when the spread between palm oil (generally the cheapest biodiesel feedstock traded internationally) and fossil fuel diesel lowers the unsupported price of biodiesel below fossil diesel. China has seen solid growth in its exports of biodiesel since 2016 driven by demand for waste-based biodiesel in Europe which is incentivized under the EU’s Renewable Energy Directive and supported by a 70 percent VAT rebate. Some of this product, when misclassified, could be HDRD since sales of HDRD to Europe have been documented by market analysts.

Table 3. China: Biodiesel Production, Supply, and Distribution

Biodiesel (Million Liters)										
Calendar Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021f
Beginning Stocks		0	0	0	0	0	0	0	0	0
Production	927	1,079	1,133	787	909	1,043	834	939	1,455	1,700
Imports	49	895	1,028	33	8	18	853	953	102	114
Exports	0	0	43	27	76	194	357	752	1,035	1,250
Consumption	976	1,974	2,118	793	841	867	1,330	1,140	522	564
Ending Stocks										
BalanceCheck	0	0	0	0	0	0	0	0	0	0
Production Capacity (Million Liters)										
Number of Biorefineries	52	53	53	53	48	46	44	40	42	44
Nameplate Capacity	3,600	4,000	4,000	4,000	2,680	2,680	2,680	2,680	2,726	2,800
Capacity Use (%)	25.8%	27.0%	28.3%	19.7%	33.9%	38.9%	31.1%	35.0%	53.4%	60.7%
Feedstock Use (1,000 MT)										
UCO	907	1,055	1,108	771	891	1,022	816	918	1,411	1,650
Feedstock B										
Feedstock C										
Feedstock D										
Market Penetration (Million Liters)										
Biodiesel, on-road use	270	324	340	236	273	313	410	430	250	260
Diesel Pool, on-road use	131,797	133,383	133,365	134,375	130,564	130,538	126,898	135,370	136,149	141,000
Blend Rate (%)	0.2%	0.2%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%	0.2%	0.2%
Diesel Pool, total 1/	202,765	205,205	205,177	206,816	200,417	199,954	195,549	205,302	210,851	222,150

Note: Fuel pools are defined as fossil fuels plus all "bio-components" (biofuels) blended with fossil diesel.

f = forecast; All PSD data are B100 or B100-equivalent (see statistical info section of Reporting Instructions).

Used cooking oil (UCO): 1 MT = 1,043 liters of UCOME (UCO methyl ester)

Source: Post and Industry sources

In late 2019, as Brent oil and ICE Gasoil prices held steady and rising palm oil prices led to higher prices for palm oil biodiesel from Indonesia and Malaysia, China's discretionary demand for biodiesel from those countries (main foreign suppliers to China due to lowest priced available product) was choked off. Prices for competing products traded (fossil diesel impacted by oil prices and biodiesel from these two southeast Asian countries) have fluctuated since due to several demand factors, but price relationships disadvantaging biodiesel have held holding any recovery in China's discretionary demand in check. While Chinese domestic demand for biodiesel is estimated to be up slightly in 2021 from the year before, it is a significant fall from the last pre-Covid year of 2019.

Consumption

China's 2021 biodiesel consumption is estimated at 564 million liters, essentially unchanged from 2020, but 50 percent below 2019 levels and 40 percent below 2018. These declines are due to China's discretionary demand drop off from October through December 2019 and is essentially absent in 2020 and 2021. In contrast to most other countries, biodiesel in China is mainly used to fuel electrical power generation, fishing vessels, and farm equipment. Industry sources report that on-road transport accounts for only about one-third of total biodiesel demand. UCO is the main feedstock for China's biodiesel production. Since NDRC launched the UCO reutilization and disposal pilot program in 2010, over 100 pilot cities have been identified. But these cities lack the biodiesel producers to seamlessly receive the UCO collected.

In February 2021, Shanghai revised the [Administrative Measures on Promoting and Using Gutter Oil to Produce Biodiesel](#). The measures will take effect on March 1 and last for two years demonstrating this municipality stands apart from the rest of the country making some effort to create a market. The government will subsidize biodiesel blenders based on the amount of biodiesel sold to gasoline stations. The government will also subsidize producers when diesel prices drop below 6,000 yuan per ton. The city has also published the industry Standard of B10

Diesel produced by UCO early this year. Time will tell if any measure of success is achieved. In January 2021, Hainan proposed resuming the B5 mandate the province used to adopt 10 years ago.

Currently, Shanghai is the only local authority moving forward to implement a biodiesel program. In October 2017, Sinopec Shanghai began offering B5 diesel at a \$0.05 per liter (0.3 yuan) discount to regular diesel as part of a pilot program. The Shanghai program aims to buck a historical precedent where previous efforts to adopt local and provincial biodiesel blending mandates failed. Shanghai produces about 40,000 tons of UCO each year. There are 18 designated companies collecting UCO every day. Currently, Shanghai has established three blending centers with annual distribution capacity of B5 diesel of 400,000-600,000 tons (equivalent to 20,000-30,000 tons or 22.7-34 million liters of B100 biodiesel) to 243 gas stations, which accounts for 41 percent of Sinopec Shanghai's total gas stations in the city. About 14 million cars/times used B5 diesel.

Production

China's 2021 biodiesel production is forecast at 1.7 billion liters, up by more than 54 percent from 2020 due to strong exports. Beginning in 2020, China's fatty acid methyl esters (FAME) biodiesel producers have a yearly production capacity of more than 2.5 billion liters (2.2 million tons). These facilities are mainly located in Shandong, Guangdong, Shaanxi, and Jiangsu. Hydrogenation-derived Renewable Diesel (HDRD) plants have a combined capacity of more than 1.3 billion liters (1.15 million tons) per year with an additional 1.3 billion liters (1.15 million tons) per year capacity planned. Most plants are export-oriented to supply Europe.

Table 4. China: Major Biodiesel Producers

China's Major Biodiesel Producers		
	Producers	Production Capacity
FAME (Fatty Acid Methyl Esters)	Zhuoyue New Energy	632 million liters (380,000 tons)
	Hebei Jingu Group	284 million liters (250,000 tons)
	Bimei New Energy	114 million liters (100,000 tons)
	Tangshan Jinhai Biodiesel	68 million liters (60,000 tons)
	Hebei Longhai Biofuel	68 million liters (60,000 tons)
	Shandong Fenghui	68 million liters (60,000 tons)
	Zhejiang Jia'ao Environment Protection	57 million liters (50,000 tons)
	Zhejiang Dongjiang Energy Technology	57 million liters (50,000 tons)
	Jingzhou Dadi Biotechnology	57 million liters (50,000 tons)
	Shanghai Zhongqi Environment Protection	41 million liters (36,000 tons)
HDRD (Hydrogenation- derived Renewable Diesel)	Beijing Sanju Environmental Protection	613 million liters (490,000 tons)
	Jiangsu's Yangzhou Jianyuan Biotechnology	159 million liters (140,000 tons)
	Shijiangzhuang Changyou Bioenergy	227 million liters (200,000 tons)
	Zhangjiagang Eco Biochemical Technology	284 million liters (250,000 tons)

Source: Industry

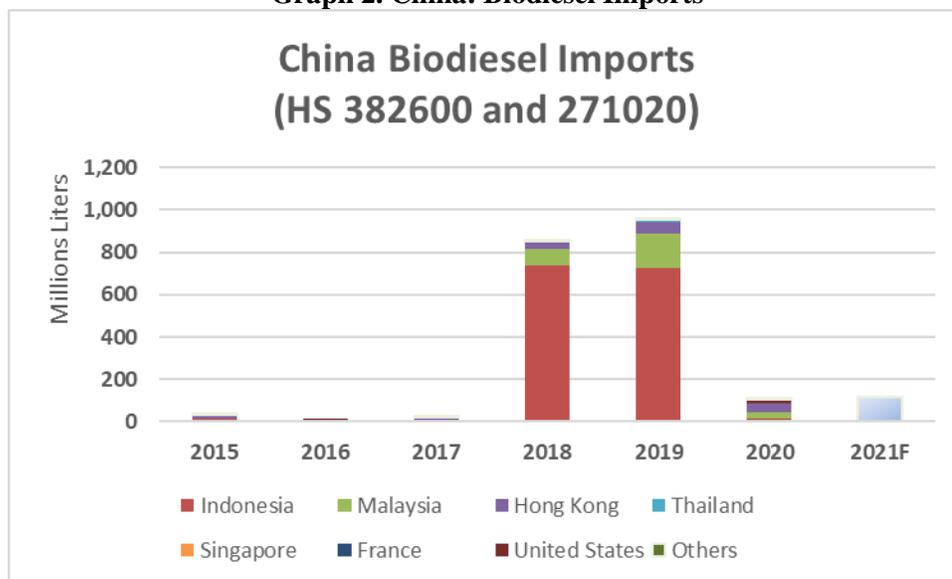
From its inception, China's biodiesel production plan has aimed to move UCO away from food use and allay food safety concerns. China's biodiesel industry continues to wholly rely on UCO for feedstock. Some smaller food-grade oil brokers blend waste cooking oil, commonly known as "gutter oil," with food-grade oil to resell for restaurant use. Industry reports that China produced more than 10 million tons of UCO in 2020, including gutter oil and waste oil from meat processing. The newly adopted garbage sorting programs in large cities may generate as much as an additional 3 million tons of waste oil in 2025. In general, 0.9-0.98 tons of UCO will produce one ton of biodiesel.

Trade

Biodiesel imports in 2021 are estimated at 114 million liters, unchanged from the previous year, and significantly lower from 2019's level of 953 million liters, the highest imports since 2014 when the previous surge in discretionary demand occurred. As in the past, industry sources report that more than 90 percent of imports are palm oil biodiesel from Indonesia and Malaysia.

2021 was a good year for China's export-oriented biodiesel producers thanks to the EU's strong demand. Industry reported average domestic biodiesel prices had reached RMB 8,000 per ton in early 2021, with even higher prices for HDRD. Fossil fuel diesel prices are between RMB 6,000-7,000 per ton. Current biodiesel prices are no longer affordable on the domestic market but are still competitive in trade to Europe, in part or largely due to the EU's RED policy which many member states implement permitting the double counting of waste-based biofuels against individual country renewable energy goals. From January to May 2021, China's biodiesel exports have followed the 2020 trend and risen by 17.3 percent year-on-year. The vast majority is shipped to the Netherlands and Spain. Despite the export expansion, China's exports only account for 3-5 percent of the EU's biodiesel/ HDRD renewable diesel demand, based on trade reported under the Chapter 38 code. It is unclear if some or all of China's HDRD exports to Europe fall under the designated Chapter 38 code for biodiesel or if they fall under Chapter 27. HDRD cannot be accurately tracked at this time due to code uncertainties which will be investigated further.

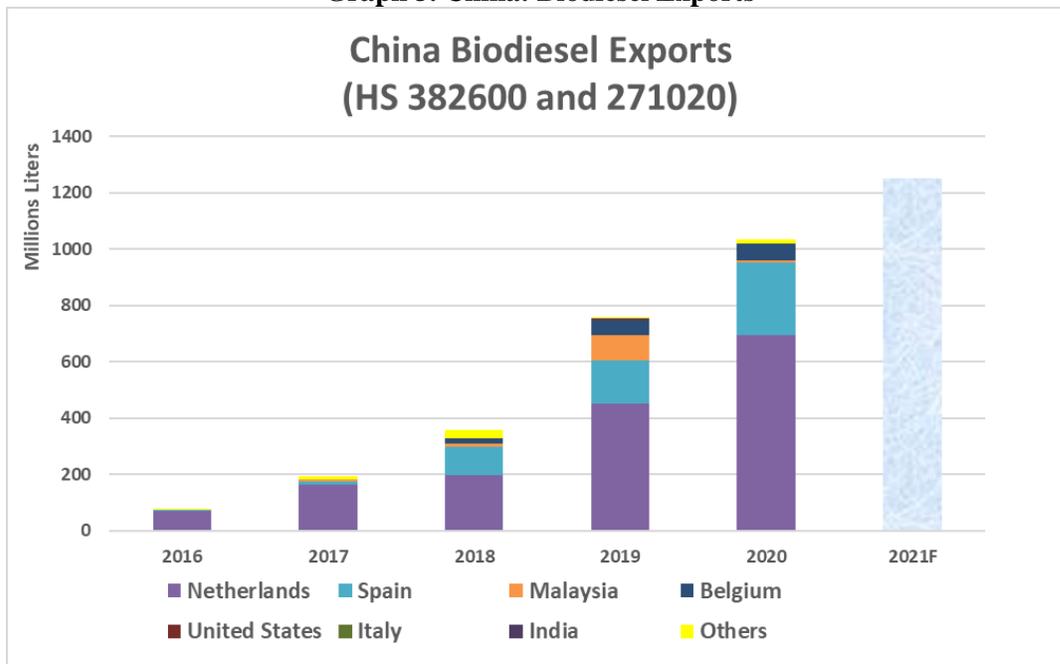
Graph 2. China: Biodiesel Imports



Sources: Trade Data Monitoring and General Administration of China Customs

At a national biodiesel industry conference, industry representatives concluded that the COVID-19 pandemic has had little impact on China's biodiesel industry as exports are robust, reaching more than 1 billion liters in 2020. At the same conference, leading biodiesel producers reported they will "join hands" to report to supervising government authorities that the tax policy on biodiesel exports are unreasonable as UCO is their major feedstock for biodiesel and the PRC no longer had a tax refund for biodiesel exports. In addition to strong biodiesel exports, industry sources expect Chinese will also export as much as one million tons of UCO in 2021.

Graph 3. China: Biodiesel Exports



Sources: Trade Data Monitoring and General Administration of China Customs

Note: All product trade under HS 3826.00 is assumed to be pure B100 biodiesel; All product under HS 271020 as petroleum oil, containing biodiesel up to 30 percent, is assumed to contain on average 10 percent biodiesel by volume, converted and reported as B100 equivalent. Due to uncertainty in trade codes used for HDRD, it is possible some of the product traded under the biodiesel code in Chapter 38 could be HDRD that should be reported under Chapter 27 (according to NesteOil). The accurate tracking of HDRD will be investigated.

V. Advanced Biofuels

Fuel ethanol in China is mainly produced from corn and rice using conventional fermentation. However, the industry is investing significant resources to transition to advanced biofuels such as cellulosic bioethanol as well as coal and industrial flue gas-based synthetic ethanol.

Cellulosic ethanol development accelerated in late 2020. In November 2020, SDIC's advanced cellulosic fuel company in Heilongjiang's Hailun city announced plans for a cellulosic fuel ethanol pilot project with an annual production capacity of 30,000 tons. This project is designed to consume 582 tons of corn stalks daily. Also, in 2021, NCPC Jilin Company's research institutes reported a breakthrough in their "10,000-ton scale cellulosic fuel ethanol whole-set technology development". To date, the project has finished accreditation for the enzyme technology and filed for four national patents. In addition, two more cellulosic fuel ethanol projects with 558 million liters (440,000 tons) capacity are reportedly seeking investors in Jilin province.

However, the only existing cellulosic fuel ethanol plant, was delisted from the stock market in July 2020. According to industry sources, the company's challenges are limiting any real growth in cellulosic ethanol production soon without any targeted, significant government support policies.

Cellulosic Ethanol

China's biofuel policy defines second generation biofuels as those made from cellulosic biomass and algae. According to the 12th Five Year Plan (2011-2016) for strategic emerging industries, China aimed to use biomass energy sources to develop second generation biofuels.

Cellulosic ethanol is prominently featured in the joint announcement by China's NDRC and other ministries in the September 2017 "Implementation Plan for the Expansion of Ethanol Production and Promotion for Transportation Fuel". The target reportedly was to build more than 760 million liters (600,000 tons) per year

production capacity by 2020. This goal is far from being met. As in the United States and Europe, cellulosic ethanol projects in China have repeatedly failed to meet expectations and timelines for commercialization and are moved forward year after year. Cellulosic ethanol plants face logistics challenges to supply reliable volumes of feedstock at low cost and are far more expensive than conventional ethanol plants to build and operate. China's cellulosic ethanol industry, like those found elsewhere, face challenge including finding high levels of foreign matter in bales of stalks, straw, and stover, and optimizing the use of enzymes to convert cellulosic material to energy.

Bio-energy is commonly cited as a preferred option for the disposal of large volumes of crop residues in China to reduce field burning under uncontrolled conditions that result in widespread air particulate matter pollution. China's estimated national crop straw and stalks resources are between 800 million tons and 1.1 billion tons. Each ton of corn as grain yields about 1.1 tons of corn straw residues, some of which must be left in the field to provide erosion control and other benefits.

In China, growers customarily either burn crop residues in the fields, or gather and bundle these residues to use as heating fuel for the winter. Since 1999, local authorities have announced strong enforcement measures to lower particulate matter emissions and air pollution and curb the practice. In 2017, MOF offered subsidies as high as \$1.5 million to \$3.0 million (10 to 20 million RMB) for each city and county pilot project to utilize straw as an energy feedstock. Qualified projects include procurement of stalk processing equipment, such as baling machines, straw and stalk-based bioenergy electrical power generation, and construction of straw and stalk buying points (receiving, grading, storage, and marketing). Farmers face cash penalties and detention if they fail to comply with burning rules. However, the economic cost of gathering and transporting biomass for cellulosic processing exceeds the subsidy value offered by local authorities. A recent economic study reported that straw collection is limited by low economies of scale, lack of public awareness, and limited access to equipment.

Sustainable Aviation Fuel (SAF)

There are no updates in 2021 on China's sustainable aviation fuel industry development. Please see the 2020 Biofuels Annual.

Synthetic Fuel Ethanol

China's efforts to reduce air particulate matter and other fossil fuel toxins include projects that convert coal and industrial waste gas into synthetic ethanol. At the same time, China's adoption of more stringent environmental standards further constrains expansion of existing coal-to-syngas-to-ethanol processing facilities.

In 2019, several non-fuel, industrial chemical ethanol producers in Jiangsu province that use coal and synthetic gasification technology closed in the wake of weakening demand for industrial chemicals, and the implementation new environmental and safety requirements. Currently, one 58-million-liter-per year fuel ethanol facility in Hebei is under operation and another 57-million-liter-per-year production line, the Ningxia Shougang Lanza Jiyuan started production in May 2021. In September 2020, the first syngas-based fuel ethanol plant in Guizhou witnessed project signing ceremony. Once operated, the plant will produce 76 million liters (60,000 tons) of fuel ethanol per year. By the end of 2022, China's Syngas ethanol production capacity is expected to reach 2.5 billion liters (2 million tons) per year. While little progress has been made on this front, this news and figures continue to be reported regularly in the Chinese press and by industry contacts. Though Post does not expect this to be achievable within this timeframe.

Annex I

China's Long March Towards National Biofuel Market Development: Production/Consumption Targets and Feedstock Priorities.

10th FYP (2001-2005) – Corn Surplus Period

China implemented a fuel ethanol program, one of the world's earliest, starting in the early 2000's to create additional demand for then abundant grain supplies. In MY1998/99, USDA ending stocks estimates for China reached record highs at 123.8 million tons. During these early years, most domestic ethanol production relied on existing corn surpluses and was in essence a corn disposal program. Beginning in 2005, as global grain prices soared, China began its initial promotion of nongrain, conventional fuel ethanol production known as Generation 1.5 ethanol.

11th FYP (2006-2010) – Corn Surplus Moderated

China's 11th Five-Year Plan (2006-2011) was the first targeting the production of biofuel from non-grain materials, including sweet sorghum, potatoes, and cassava root for ethanol, and jatropha trees for biodiesel.

Beginning in 2006, 11 provinces (Heilongjiang, Henan, Jilin, Liaoning, Anhui, Guangxi, Hebei, Shandong, Jiangsu, Inner Mongolia, and Hubei) were selected as pilot zones for fuel ethanol production and 'mandatory' E10 blend use. Many fuel retailers argued in courts and protested state-owned petroleum giants that China's implementation of biofuels blending targets restrict their ability to respond to market prices, undercutting their profitability and the long-term sustainability of their businesses. As a result of these concerns, some provinces with blending requirements do not fully enforce province wide E10 blending. Many provinces remain with no blend mandate and use MTBE instead (then and today) since they have no major corn growing areas and thus little economic interest in an ethanol program.

In August 2007, NDRC published a "Mid- to Long-term Renewable Energy Development Plan" that targets annual fuel ethanol use to exceed 12.670 billion liters (10 million tons) by 2020, effectively expanding production by five-fold from 2007 to 2020.

During a period of high corn prices in 2008, China restricted construction of new ethanol facilities. Starting in 2010, phase out of PRC government subsidies for conventional ethanol plants began, falling from \$0.03 per Liter (RMB 2,000 per ton) in 2009 to zero in 2016. Ethanol production subsidies using non-food grain feedstocks to produce conventional ethanol were also phased out by 2018. Afterwards, China limited the growth of corn use for fuel ethanol when rising domestic grain prices triggered food price concerns. During this same period, China became a net corn importer.

12th FYP (2011-2015) – Corn Surplus Period

In 2010, the government set ambitious targets for ethanol and biodiesel in its 12th FYP, including a goal of producing 5.068 billion liters (4.0 million tons) of fuel ethanol and 1.136 billion liters (1.0 million tons) of biodiesel by 2015.

Despite significant investments in research and development, government efforts to expand production of non-grain conventional fuel ethanol never materialized into commercial-scale projects.

The 12th FYP goal for biodiesel was met early in 2014. However, both biofuel production targets fell short in 2015. In 2015, fuel ethanol production reached just 2.9 billion liters (2.3 million tons), or less than two-thirds of the original 5.1 billion liter (4 million ton) 12th FYP goal.

13th FYP (2016-2020) – Corn Stocks Drawdown

On October 24, 2016, China's State Council announced its 13th FYP goal to produce 5.1 billion liters (4 million tons) of ethanol and 2.3 billion liters (2 million tons) of biodiesel by 2020. While the goal requires ethanol production to rise four-fold from 2016 levels, underlying economic fundamentals and the lack of national or provincial government support undermined large-scale efforts to expand production.

Government policies introduced in 2016 paved the way for a fuel ethanol industry revival through the elimination of the temporary reserve policy for corn; reinstatement of the VAT refund on ethanol products added further support. Industry sources reported at the time that China's provincial corn processing subsidies and a nationwide effort to expand E10 effectively supported margins for ethanol producers.

On September 13, 2017, NDRC, NEA, Ministry of Finance (MOF) and 12 other ministries jointly announced a plan to expand ethanol production and promotion for transportation fuel. This included a nationwide target of 10-percent ethanol blending into gasoline fuel by 2020, and a proposed shift to commercial-scale cellulosic ethanol by 2025. To date, the PRC has not proposed an updated volumetric target for commercial-scale cellulosic ethanol production. On August 22, 2018, Chinese Premier Li Keqiang addressed China's State Council, and reiterated the central government's commitment to expand ethanol use nationwide.

In December 2019, media reported that China will suspend the expansion of its E10 mandate, essentially confining it to regions where it had already been introduced as corn stocks were too low and ethanol production capacity too small to implement E10 properly nationwide. The expressed use of imports as a vehicle to advance the E10 goal remained off the table.

14th FYP (2021-2025) – Corn Stocks Drawdown

The outline of the 14th FYP for Economic and Social Development (2021-2025), published in March 2021, sets an 18 percent reduction target for "CO2 intensity" and 13.5 percent reduction target for "energy intensity" from 2021 to 2025. The Plan requires "strengthening the management of urban air quality compliance, promoting coordinated control of fine particulate matter (PM 2.5) and ozone (O3), reducing the PM2.5 concentration of cities at prefecture-level and above by 10 percent, effectively curb the increasing trend of O3 concentration" and "basically eliminate heavily polluted weather", which researchers estimate it will require a 70–80 percent reduction in pollution emissions in northern China by 2025. The degree to which the use of fuel ethanol and biodiesel will be used to advance these objectives remains unclear.

Attachments:

No Attachments