

Bio-based Material Quarterly Newsletter

Q4 2022

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Headline

The Guzhen County Economic Development Zone updated on progresses made according to its Development Plan for PLA Products Manufacture Industrial Parks for 2020–2025 facilitating the industrial development of new bio-based materials.

In Dec., GS Biotech completed a Pre-A round of financing generating around USD14.04 million (RMB100 million) for development of HMF, FDCA, THFDM business.

In Nov., Jindan Technology proposed to issue USD98 million convertible bonds for the development of a 75,000 t/a PLA project.

In Q4, Huaheng Biotech plans to construct a 50,000 t/a 1,3-PDO and a 50,000 t/a bio-based SA project.

In Q4, Zhuhai Kingfa and Liaoning Kingfa have put PLA and LA projects under EIA process.

In Nov., Weiqi Biotech completed process verification for new 10,000 t/a plus PHA production lines and launched its first batch of PHA products onto markets both at home and abroad.

Eppen New Material successfully ran trial production on the 20,000 t/a bio-based PDA and nylon (PA56) project.

Shaanxi Coal Research Institute's carbon dioxide-based degradable material PCHC preparation pilot project was approved and publicised by Weinan Municipal Ecology and Environment Bureau on 24 Oct.

In late Sept., Sateri Changzhou started trial run of the new Loycell fibre production line with the largest capacity of 100,000 t/a in China.

On 16 Dec., Shengquan Group announced plan to invest USD348.19 million (RMB2.48 billion) into construction of 100,000 t/a bio-based hard carbon anode material project.





Editor's Note

Welcome to the Bio-based Material Quarterly Newsletter Q4 2022.

Policy

The Guzhen County Economic Development Zone updated on progresses made according to its Development Plan for PLA Products Manufacture Industrial Parks for 2020–2025 facilitating the industrial development of new bio-based materials in Oct.

Market dynamics & company performance

In Q4, some programmes have been accomplished in China: GS Biotech completed a Pre-A round of financing generating around USD14.04 million (RMB100 million) for development of HMF, FDCA, THFDM business; Weiqi Biotech completed process verification for new 10,000 t/a plus PHA production lines and launched its first batch of PHA products onto markets both at home and abroad; WOTE signed polyamide R&D agreement with SIAT hand in hand; some bio-based material projects have entered trial production, for instance, Eppen New Material's 20,000 t/a bio-based PDA and nylon 56 project (phase I), Sateri Changzhou's Loycell fibre production line with the largest capacity of 100,000 t/a in China and Bluepha's 25,000 t/a PHA project (phase I).

In the meantime, multiply new projects are brought up, including Huaheng Biotech's 1,3-PDO project, Shaanxi Coal Research Institute's PCHC preparation pilot project, Shengquan Group's hard carbon anode material project, Shangdong Gaochuang and Hubei Xingchen's PLA and PHA projects, Huaфон Group's PTT project and the PLA project between Karamay municipal government and Huaxia Dadi, along with some reconstruction and expansion projects such as Jindan Technology's PLA project and Huaheng Biotech's bio-based SA project, and some in development, i.e. Kingfa and Jiangxi Keyuan's PLA and LA projects, Hongye Biotech's THF and methanol project and Huaфон Group's PPC project.

Price

During Q4 2022, PLA prices fluctuated between USD3,229.20/t–USD3,299.40/t (RMB23,000/t–RMB23,500/t), while PHA prices remained stable.

The USD/CNY exchange rate in this newsletter is USD1.00=CNY7.1225 on 1 Dec., 2022, sourced from the People's Bank of China. Unless otherwise specified, all the prices mentioned in this newsletter will include the VAT.





Governmental Direction

Guzhen County Economic Development Zone updates on development plan for PLA products industrial for 2020–2025

Summary: The Guzhen County Economic Development Zone updated on progresses made according to its Development Plan for PLA Products Manufacture Industrial Parks for 2020–2025 facilitating the industrial development of new bio-based materials.

On 28 Oct., the Guzhen County Economic Development Zone of Anhui Province updated on progresses made according to its Development Plan for PLA Products Manufacture Industrial Parks for 2020–2025 (the Plan). Three key areas—polylactic acid (PLA) matrix materials in upstream, PLA modified materials in midstream and PLA products in downstream—are highlighted in the Plan integrating the whole PLA industrial chain from materials to products and aiming to scale up the industrial capacities.

Planning background

In recent years, the Guzhen County Economic Development Zone has founded complete sets of infrastructure in parks necessary for local industrial development of bio-based new materials, with the joining and supports of China BBKA Group Corporation (BBKA Group), a major industrial player and a key contributor to the establishment of the PLA Products Manufacture Industrial Park in this development zone and to technical breakthroughs in manufacturing PLA that spark explosive growth of the biochemical industry in Guzhen County. Despite all the achievements made, capacity optimisations are planned to change the current inverted pyramid layout of the county's PLA industry chain: In present, the locally planning and constructed PLA capacity is massive in upstream which is expected to be more than 15 times the current global production capacity in 5 years. In midstream, the production capacity of PLA modified materials remains low in short of capacities for auxiliary agents. And in downstream, the production scale of such PLA products as films, sheets, fibres, injection mould is much smaller, insufficient in consuming production from the upper reaches.

General targets for 2020–2025

- BBKA group's LA & PLA capacity plans: to form capacities for 3.15 million t/a of lactic acid (LA) and 1.9 million t/a of PLA over 6 PLA construction projects, which will help it break into the world's top 3 by market competitiveness in PLA industry.
- The Plan prioritises the two categories, chemical fibres and films including products like undrawn/drawn yarn, draw textured yarn, plastic bags, packaging and agricultural films, and films for special purposes for downstream development; and it targets to build up a total 1.3 million t/a production capacity of such products.
- The local PLA industry is estimated to gain the number of PLA enterprises with annual output value of over USD1.40 billion (RMB10 billion) settled in the zone reaching 6 or more, and that of enterprises with annual revenue of over USD2.80 million (RMB20 million) reaching 90 or more; the PLA Products Manufacture Industrial Park is looking to total revenue up to USD22.46 billion (RMB160 billion).

Long-term plan for 2025–2030

The Plan also includes goals in 5 years from 2025 to 2030:

- BBKA group's LA & PLA capacity plans: to add capacity for 3.1 million t/a of PLA by 2030 on to the 3.15 million t/a LA and 1.9 million t/a PLA planned for 2020–2025, and to produce with lactide purchased from other companies, which means the group is expected to have a total capacity of 3.15 million t/a LA and 5 million t/a PLA after 2025.
- The PLA Products Manufacture Industrial Park is set to meet over USD56.16 billion (RMB400 billion) in revenue and found 10





million t/a PLA capacity in aggregate by 2030.

- To complete construction of the world's biggest PLA and related products industrial cluster in the zone area, making it the mainstay in the global fight against plastic pollution.

TABLE 1: Key planning projects related to PLA matrix materials in Guzhen County Economic Development Zone, 2020–2030

No.	Project	Construction content & designed capacity	Investment, billion USD	Estimated output value, billion USD	Construction period
1	L-lactic acid expansion project	6 New sets of fermentation equipment, each accounting for L-lactic acid capacity of 500,000 t/a, using corn as raw materials, producing 3.15 million t/a of L-lactic acid	2.19	4.42	2020-2025; at least one set of equipment should be built in per year
2	Poly L-lactic acid (PLLA) expansion project	6 New sets of production equipment, each accounting for PLLA capacity of 300,000 t/a, using L-lactic acid as raw materials, producing 1.90 million t/a of PLLA	2.02	5.34	2020-2025; at least one set of equipment should be built in per year
3	PLLA project with purchased lactide	10 New sets of production equipment, each accounting for PLLA capacity of 300,000 t/a, using lactic imported from Brazil as raw materials, producing 3.10 million t/a of PLLA	3.37	8.70	2026–
4	Non-grain biomass-derived sugars project	New hexose and pentose production equipment, using agricultural and forestry wastes as raw materials, producing 500,000 t/a of hexose and pentose to feed one L-lactic acid fermentation equipment with production capacity of 500,000 t/a	0.21	0.07	2026–

Source: Development Plan for PLA Products Industry in Manufacture Industrial Parks for 2020–2025

Reportedly, the PLA industrial park in Guzhen County has established 400,000 t/a corn starch, 200,000 t/a starch sugar, 150,000 t/a LA and 100,000 t/a PLA, along with the supporting facilities like power stations and waste water treatment; there are projects under construction including establishment of 300,000 t/a PLA, 50,000 t/a lactide and 500,000 t/a LA; some are in the early planning stage including projects for 1 million t/a LA, 600,000 t/a PLA and 700,000 t/a environment-friendly PLA materials.





GS Biotech completes USD14.04 million Pre-A financing

Summary: In Dec., GS Biotech completed a Pre-A round of financing generating around USD14.04 million (RMB100 million) for development of HMF, FDCA, THFDM business.

On 5 Dec., 2022, Zhongke Guosheng (Hangzhou) Technology Co., Ltd. (GS Biotech) disclosed the completion of financing of USD14.04 million (RMB100 million) in a Pre-A round led by Legend Capital and followed by Junsan Capital and Eastern Bell Capital, the transaction of which was completed in early August. The proceeds will be used in capacity expansion for its core pipeline products including 5-hydroxymethylfurfural (HMF), 2,5-furandicarboxylic acid (FDCA) and 2,5-tetrahydrofuran dimethanol (THFDM) and in continuous development of downstream derivatives.

Incorporated in July 2021 with a registered capital of USD204,984 (RMB1.46 million), GS Biotech specialises in the design and development of bio-based furans materials. It has pioneered the world's leading continuous production technique of HMF, cutting down the cost from USD21,060/t (RMB150,000/t) to below USD7,020/t (RMB50,000/t). The core founders are graduated from Dalian Institute of Chemical Physics, Chinese Academy of Sciences with 20 years of research foundation and industrialisation experience in the area of catalytic conversion of biomass and the design & development of furans materials.

Dr. Zhang Yu, CEO of GS Biotech, introduced that the company has triumphed over the problems of cost and source of raw material of HMF with its original continuous production technology which can not only reduce cost but also lift production efficiency in a significant way. It has also planned multi-dimensional approaches for cost cuts including use of non-grain raw materials, production technique upgrading and capacity expansion to keep a rein on the cost of HMF to around USD1,404/t (RMB10,000/t) within three years. The company has developed more than 20 kinds of high value-added monomers and has been testing their applications in the terminal markets. So far GS Biotech has collected supportive data proving the improved functions of products like polyethylene 2,5-furandicarboxylate (PEF), bio-based surfactants and bio-based aramid fibres and reportedly will move further into the application verification in segmented markets so as to bring them to market as soon as possible.

Industrial layout

As adopting market demand-oriented production schedule, GS Biotech has delivered several more FDCA orders, each of one tonne plus, on the heels of its send-out of China's first a tonne-scale FDCA order in May this year, in addition to the rising scale production and sales of HMF, THFDM and other core monomers.

At present, GS Biotech has two main production bases in full operation and under construction, details as below:

- Lishui Pilot Production Base, constructed by Zhongke Guosheng (Lishui) New Material and Technology Co., Ltd., 51% owned by GS Biotech, has been operating at full to fulfil market demand. This base, invested USD2.67 million (RMB19 million) and located in Lishui City Economic Development Zone of Zhejiang Province, has capacities of 5 t/a of PEF, 20 t/a of FDCA and 500 t/a of 10% HMF solution.





- Taixing Production Base, constructed by Zhongke Guosheng (Taixing) New Material Technology Co., Ltd. wholly-owned by GS Biotech, broke ground on 30 July and is still under construction in Taixing City of Jiangsu Province with designed investment totalling USD179.71 million (RMB1.28 billion) in building capacities of bio-based materials and platform compounds such as HMF, FDCA, THFDM and PEF. The 1st phase construction is to take up 36,000 m² of the 76,000 m² total site area and end in Nov. 2023 in estimate. This base is expected to be the world's first demonstration production base integrating whole industrial chain production from raw materials to platform compounds, derivatives, and polyesters in the HMF sector, as well as the world's first low-carbon demonstration plant for bio-based material utilising low-carbon equipment like photovoltaic power generator that allows reduction of carbon dioxide emission of 3,000–5,000 t/a according to Dr. Zhang Yu.
- In the meantime, GS Biotech is promoting planting of non-grain crops as sources of raw materials for HMF in collaborative programme for land use improvement.





Market Analysis

Jindan Technology to issue USD98 million convertible bonds injecting into 75,000 t/a PLA project

Summary: In Nov., Jindan Technology proposed to issue USD98 million convertible bonds for the development of a 75,000 t/a PLA project.

On 8 Nov., 2022, Henan Jindan Lactic Acid Technology Co., Ltd. (Jindan Technology) announced public offering of convertible bonds in a maximum value of USD98.28 million (RMB700 million), with a maturity of 6 years. The proceeds are proposed to be used in the 75,000 t/a biodegradable new material (polylactic acid/PLA) project and replenishing working capital.

In April 2020, Jindan Technology planned to use a portion of the funds raised in its IPO in the construction projects for 10,000 t/a PLA and 50,000 t/a high-gloss pure L-lactic acid. In Nov. 2021, the construction of 50,000 t/a high-gloss pure L-lactic acid was completed and started operation, while the original project for 10,000 t/a PLA had never been initiated by July 2022, and was then altered into the 75,000 t/a biodegradable new material (PLA) project to be implemented by the subsidiary Jindan Biological New Material Technology Co., Ltd. (Jindan New Material) with total planned investment increasing from the original USD7.39 million (RMB52.62 million) to USD123.85 million (RMB882.12 million).

Jindan Technology said that the increasing production capacity could be properly distributed after a certain run-in period for new capacity facility to reach full operation and the market to absorb, adding that China's PLA industry is in the nascent stage seeing PLA product prices notably higher than that of the traditional plastics, and at present the environmental protection regulations and policies are what encourage the downstream demand the most.

TABLE 2: Main products and production capacity of Jindan Technology, 2019–Sept. 2022

L-lactic acid	Jan.–Sept. 2022	2021	2020	2019
Production capacity, t/a	116,250	155,000	105,000	105,000
Production volume, tonne	91,293	123,539	104,293	90,574
Lactate	Jan.–Sept. 2022	2021	2020	2019
Production capacity, t/a	21,000	23,000	23,000	23,000

Note: The 50,000 t/a high-gloss pure lactic acid project was put into production in Nov. 2021.

The 150,000 t/a production capacity (phase I construction) of the 200,000 t/a high-gloss pure lactic acid project is not included in this table.

Source: Jindan Technology



**TABLE 3:** Product revenue of Jindan Technology, 2019–Sept. 2022, million USD

Item	Jan.–Sept. 2022	2021	2020	2019
L-lactic acid	93.36	120.62	97.57	80.53
Lactate	30.70	33.24	23.99	24.65
By-products	20.00	25.90	11.96	10.13
Others	17.63	22.71	10.71	7.98
Total	162.70	202.47	144.23	123.29

Source: Jindan Technology

On 17 Nov., 2022, the environmental impact assessment document of Jindan New Material's 75,000 t/a biodegradable new material (PLA) project was publicised by authority before granting approval.

Project overview

- Construction nature: Reconstruction and expansion
- Construction site: Dancheng County, Zhoukou City, Henan Province
- Site area: 60,000 m²
- Total investment: USD123.85 million (RMB882.12 million)
- Construction content: New lactide and PLA production units will be constructed accompanied by new and existing supporting facilities, storage, transportation and environmentally-friendly structures.
- Designed capacity:
 - 75,000 t/a PLA (purity≥95%)
 - 9,785 t/a oligolactic acid (by-product), which can easily generate industrial-grade lactic acid (LA); Jindan Technology and Dengzhou Jinbi Bio-material Technology Co., Ltd. have reached purchase intention with Jindan New Material for 5,000 t/a LA and 6,000 t/a LA, respectively.
- Production technique: Indirect method (lactide ring-opening polymerisation)—synthesise PLA using LA as raw material and purify crude lactide generated via dehydration, depolymerization and cyclization; product yield is expected to be 70.8%.
- Raw materials:
 - 105,000 t/a L-lactic acid supplied by Jindan Technology through pipelines
 - Jindan Technology currently has a two-phased project for 400,000 t/a starch and 200,000 t/a high-gloss pure LA—phase I including 150,000 t/a high-gloss pure LA has entered production, and phase II including 50,000 t/a high-gloss pure LA is under construction, projected to start production in early 2024—expected to meet the material demand for this 75,000 t/a PLA project.
- Labour quota: 100 workers
- Working system: three 8-hour shifts per day for 333 days per year
- Construction period: 24 months ending in early 2025





Huaheng Biotech to construct 50,000 t/a 1,3-PDO and 50,000 t/a bio-based SA projects

Summary: In Q4, Huaheng Biotech plans to construct a 50,000 t/a 1,3-PDO and a 50,000 t/a bio-based SA project.

On 8 Dec., 2022, Anhui Huaheng Biotechnology Co., Ltd. (Huaheng Biotech) announced to invest and construct a 50,000 t/a 1,3-propanediol (1,3-PDO) project implemented by Chifeng Zhihe Biotechnology Co., Ltd. (Chifeng Zhihe). Incorporated in Nov. 2022 with a registered capital of USD702,001 (RMB5 million), Chifeng Zhihe is wholly-owned by Tianjin Zhihe Biotechnology Co., Ltd. (Tianjin Zhihe), mainly engaged in R&D, production and sale of bio-based materials. Tianjin Zhihe is actually controlled by Huaheng Biotech, who owns 25% of its shareholdings and 100% of voting rights of the company.

Overview of 50,000 t/a 1,3-PDO project

- Total investment: USD56.16 million (RMB400 million) at most
- Construction site: Tianyi Town, Ningcheng County, Chifeng City, Inner Mongolia Autonomous Region
- Construction content: workshops including fermentation workshop and purification and refining workshop and production devices
- Designed capacity: 50,000 t/a 1,3-PDO through biological method
- Proposed construction period: 24 months

1,3-PDO in China

As an important monomer and intermediate, 1,3-PDO is mainly used in the synthesis of polytrimethylene terephthalate (PTT). By now, the industrial production of 1,3-PDO mainly adopts chemical method or biological method. Compared with chemical method, biological method is characterised with renewable raw materials, low costs and green production processes.

As China is pledging to reach peak emissions before 2030 and achieve carbon neutrality by 2060, the biological method is advantageous in low carbon emission and environmental protection. However, due to the limited domestic capability in industrial production and technology, China still highly relies on import of 1,3-PDO, most of which are produced by DuPont and later processed by the outsourcing PTT factories in the country.

Earlier on 13 Oct., 2022, Chifeng Huaheng Biosynthetic Technology Co., Ltd. (Chifeng Huaheng)'s production base construction project for 50,000 t/a bio-based succinic acid (SA) and raw material of bio-based products passed the authority's review on the record filing. Incorporated in Sept. 2022 with a registered capital of USD702,001 (RMB5.00 million), Chifeng Huaheng is wholly-owned by Anhui Huaheng Biotechnology Co., Ltd. According to the announcement posted in Sept., Huaheng Biotech has acquired the related "fermentation method for producing succinic acid" on the signing of Technology Licensing Contract with Hangzhou Ouhe Biotechnology Co., Ltd.

Overview of the 50,000 t/a bio-based SA project

- Construction nature: Reconstruction and expansion
- Construction site: Ningcheng County, Chifeng City, Inner Mongolia Autonomous Region
- Total investment: USD119.27 million (RMB849.51 million), self-funded
- Construction content:





- Transform the original 300,000 t/a corn deep-processing project;
- Construct new workshop for bio-based SA and its salts; install air system and devices for SA fermentation, extraction, starch and sugar manufacturing, by-product processing, digital automatic control, exhaust and sewage treatment
- Designed processing and production capacities:
 - processing 600,000 t/a of corn
 - producing by biosynthetic technology 340,000 t/a of raw materials for bio-based products (180,000 t/a starch + 160,000 t/a glucose), 180,000 t/a of by-products, and 50,000 t/a of bio-based SA and its salts
- Construction period: Nov. 2022–April 2025

Updates on Kingfa's PLA and LA projects

Summary: In Q4, Zhuhai Kingfa and Liaoning Kingfa have put PLA and LA projects under EIA process.

On 1 Nov., 2022, the environmental impact assessment (EIA) document of Zhuhai Kingfa Biomaterial Co., Ltd. (Zhuhai Kingfa)'s 30,000 t/a polylactic acid (PLA) polymerisation and modification project was approved by local authority. Incorporated in July 2009 with a registered capital of USD44.41 million (RMB316.30 million), Zhuhai Kingfa is wholly-owned by Shanghai Kingfa Sci. & Tech. Co., Ltd. and mainly engages in the production of special polyesters and the modified ones.

Overview of Zhuhai Kingfa's 30,000 t/a PLA polymerisation and modification project

- Construction nature: Expansion
- Construction site: Gaolangang Economic Development Zone, Zhuhai City, Guangdong Province
- Total investment: USD41.76 million (RMB297.43 million), USD2.11 million (RMB15 million) of which are for environmental protection
- Expanding site & floor areas: 5,819 m² & 12,252 m²
- Construction content: new five-storey PLA workshop with one PLA consecutive production line and three warehouses; and additional eight consecutive production lines for modified PLA to the existing workshop
- Production scale: PLA (30,000 t/a)—12,000 t/a of which are for sale and 18,000 t/a chip-shaped are to be used as raw material, blended with talcum powder and additives, for 30,000 t/a production of modified PLA materials for sale.
- PLA technique: Use purchased 32,000 t/a lactide from other companies as raw material to produce PLA chips through lactide ring-opening polymerisation adding in additives.
- Labour quota: 150 new workers—10 at managerial level, 10 technicians, 110 production workers and 20 assistants in production
- Working system: three 24-hour shifts for 300 days per year

A few days prior on 18 Oct., the EIA report of Liaoning Kingfa Biomaterial Co., Ltd. (Liaoning Kingfa)'s 50,000 t/a L-lactic acid project was publicised for the first time. Registered in May 2022 with a capital of USD70.20 million (RMB500 million), Liaoning Kingfa is a wholly-owned subsidiary to Kingfa Biomaterial and operates in R&D, production and sale of bio-based materials.

Overview of Liaoning Kingfa's 50,000 t/a L-lactic acid project

- Construction nature: New construction
- Total investment: USD78.42 million (RMB558.56 million)
- Construction site: Coastal Economic Development Zone, Liaobinwan New District, Panjin City, Liaoning Province
- Site & floor areas: 200,000 m² & 80,240 m²
- Construction content:
 - Construction—one L-lactic acid production line, workshops for starch, saccharification, fermentation and refining, public utility,





vertical storage tank, circulation pool, circulation pump house, tank-farm pump house, warehouses of lactic acid and raw materials and sewage treatment station;

- Purchase—seed tank, fermentation tank, systems for ceramic membrane, liquid extraction, mechanical vapour (MVR), packaging and other devices

- Designed capacity: 50,000 t/a L-lactic acid
- Construction period: Jan. 2023–Dec. 2024

Weiqi Biotech completes process verification for 10,000 t/a plus PHA production lines

Summary: In Nov., Weiqi Biotech completed process verification for new 10,000 t/a plus PHA production lines and launched its first batch of PHA products onto markets both at home and abroad.

On 24 Nov., Hubei Weiqi Biotechnology Co., Ltd. (Weiqi Biotech) announced the completion of the early-stage process verification for its 10,000 t/a plus polyhydroxyalkanoates (PHA) production lines, and that it had rolled out its first batch of PHA products onto markets both at home and abroad, expecting 5,000 tonnes of PHA produced to be available for the market in 2022 through distribution channels of Angel Yeast Co., Ltd. (Angel Yeast) and Beijing PhaBuilder Biotechnology Co., Ltd. (PhaBuilder, referred to as Beijing Weigou Workshop Biotechnology Co., Ltd. / Weigou Workshop in previous Bio-based Material Quarterly Issues).

Weiqi Biotech is a joint venture of Angel Yeast (40% of holdings) and Phabuilder (60% of holdings), established in Sept. this year with a registered capital of USD14.04 million (RMB100 million) for development of a 30,000 t/a PHA project.

Weiqi Biotech's green and intelligent manufacturing project for 30,000 t/a biodegradable PHA materials was approved in the authority's review for record on 17 Nov., and soon on 18 Nov. the record filing of the phase I construction of this project was greenlighted. Weiqi Biotech said that this project would become the largest PHA production base in China and the third largest in the world after Kaneka in Japan and Danimer Scientific in the US, providing the most varieties of PHA in the world. And the company plans to include numbers of materials mixed with PHA, PHB, P34HB and the likes to its first industrial production plan.

30,000 t/a PHA degradable materials green intelligent manufacturing project

- Construction nature: New construction
- Total investment: USD147.42 million (RMB1.05 billion), USD49.14 million (RMB350 million) of which are for phase I
- Construction site: Angel Biotechnology Park, Xiaoting District, Yichang City, Hubei Province
- Site area: The project site is designed to cover an area of 133,333 m², with overall floor area of 60,000 m²; site area for phase I to cover an area of 80,000 m², with floor area of 40,000 m².
- Main construction content: An integrated PHA production line, along with workshops for fermentation, extraction and drying, warehouses of raw materials and end products, supporting utilities and R&D complex
- Designed product capacity: totally 30,000 t/a of more than one hundred kinds of PHA with different functions
- Designed commencement for phase I construction: Dec. 2022

PhaBuilder

Incorporated in Feb., 2021 with a registered capital of USD856,441 (RMB6.10 million), PhaBuilder is mainly engaged in developing and





producing a variety of high value-added products, such as PHA (a biodegradable material), ectoine (a pharmaceutical intermediate), and cadaverine (a nylon-56 precursor). The founder, Professor Chen Guoqiang, is the faculty director of Synthetic Biology and Biomaterials in Tsinghua University who has cultivated in the research field of PHA for over 30 years. In Jan. 2022, PhaBuilder received funding of USD35.10 million (RMB250 million) raised from a series A round led by China's State-owned Enterprise Mixed-ownership Reform Fund Co., Ltd., followed by China SME Development Fund Co., Ltd. and Sequoia China. In Nov. 2022, it collected another funding from series A+ round of USD3.34 million (RMB95 million).

On 27 Sept., 2022, PhaBuilder and Hefei Hengxin Environmental Science & Technology Co.,Ltd. have reached a strategic cooperation. Both sides will jointly develop blending modification based on PHA materials and polylactic acid (PLA) materials in order to further improve the performance of biodegradable materials and promote industrialisation upgrade.

Except for the ongoing 30,000 t/a PHA production line project, on 1 Nov., PhaBuilder completed the construction of 1,000 t/a PHA intelligent demonstration (pilot scale) line project and succeeded in trial production. It has also planned to build 3–5 production bases nationwide in 5 years to come.





Company Dynamics

Eppen New Material completed trial production of the 20,000 t/a bio-based PDA and nylon 56 project

Summary: Eppen New Material successfully ran trial production on the 20,000 t/a bio-based PDA and nylon (PA56) project.

In late Oct., Heilongjiang Eppen New Material Co., Ltd. (Eppen New Material) completed trial production of the 20,000 t/a bio-based PDA and nylon 56 project. The production line of this project produces pentamethylene diamine (PDA) by bio-technology that applies the end/semi-finished products produced from the corn deep-processing production project (including starch, glucose, lysine and threonine) of Heilongjiang EPPEN Biotech Co., Ltd., the brother company of Eppen New Material, effectively extending its corn/lysine industrial chain. Given that the bio-based nylon 56 can partly replace chemosynthetic nylon 6 and nylon 66 products in uses, this project aligns well with the company's goal for sustainable development and provides edges on market competitiveness.

Incorporated in April 2019, Eppen New Material is a wholly-owned subsidiary to Ningxia Eppen Biotech Co., Ltd. (Eppen Biotech). In the same year of incorporation, Eppen New Material started the construction of PDA and nylon 56 project with proposed investment totalling USD182.5 million (RMB1.3 billion). The project is carried out over 2 phases, with phase I accounting for 20,000 t/a and phase II for 100,000 t/a of capacity.

Overview of the bio-based PDA and nylon 56 project (phase I: 20,000 t/a)

- Construction nature: New construction
- Construction site: Deligeer Industrial Park, Dorbod Mongol Autonomous County, Daqing City, Heilongjiang Province
- Site area: 3.35 ha (50.23 mu)
- Total investment: USD28.53 million (RMB203.21 million), USD126,360 (RMB900,000) of which are for environmental protection
- Labour quota: 95 workers
- Working system: four shifts and three 8-hour running system (330 hour each year/7,920 working hours)
- Designed construction period: 4 months starting from March 2019
- Construction content: whole-cell catalysis workshop, PDA extraction and distillation workshop (36.6 t/d), potassium sulphate workshop (48.4 t/d), nylon 56 polymerisation workshop (29.4 t/d), and warehouses of end products, by-product potassium sulphate and raw materials
- Product scheme: 4,979 t/a PDA, 4,953 t/a nylon 56 salt solution (purified), 9,706 t/a nylon 56 chips, 15,971 t/a potassium sulphate (by-product)

Overview of the bio-based PDA and nylon 56 project (phase II: 100,000 t/a)

- Construction nature: Reconstruction and expansion
- Construction site: Deligeer Industrial Park, Dorbod Mongol Autonomous County, Daqing City, Heilongjiang Province
- Site area: 15.6 ha (234 mu)
- Total investment: USD160.28 million (RMB1.14 billion), USD183,924 (RMB1.31 million) of which are for environmental protection
- Labour quota: 400 workers
- Working system: four shifts and three 8-hour running system (330 days each year/7,920 working hours)
- Operation period: 16 months
- Construction content: cell catalysis workshop, extraction-distillation workshop, potassium sulphate extraction workshop, salt formulation-polymerisation workshop, raw material warehouse, supporting facilities, etc.





- Product scheme: 10,000 t/a PDA, 20,000 t/a nylon 56 salt solution (purified), 60,000 t/a nylon 56 chips, 50,000 t/a potassium sulphate (by-product)

Technical edges:

- With respect of biological catalysis, Eppen Biotech has worked with the Institute of Microbiology, Chinese Academy of Sciences for over five years in developing strain catalysis technology which has reached 95% and above of inversion rate in producing PDA. The technology has taken international leading position in performance with 10 invention patents in application, including PCT international patent authorised by the US.
- In extraction and distillation procedure, the company's self-developed technique has resolved the problem that it is hard to separate, extract and purify PDA from the mixture of salts, proteins, PDA and water in 1,5-diaminopentane generated from biological catalysis. It obtains products in high purity and shortens the production process without generating wastes, which makes the pollutants controllable and protects the environment.

Shaanxi Coal Research Institute's carbon dioxide-based PCHC pilot project publicised

Summary: Shaanxi Coal Research Institute's carbon dioxide-based degradable material PCHC preparation pilot project was approved and publicised by Weinan Municipal Ecology and Environment Bureau on 24 Oct.

On 24 Oct., the environmental impact assessment (EIA) report of Shaanxi Coal Chemical Industry Technology Research Institute Co., Ltd. (Shaanxi Coal Research Institute)'s carbon dioxide (CO₂)-based poly(cyclohexene carbonate) (PHCH) preparation pilot project was approved and publicised by Shaanxi Weinan Municipal Ecology and Environment Bureau on the official website.

PCHC is an important aliphatic polycarbonate which is not only biodegradable but also in possession of excellent performance in blocking oxygen and water and it can be used as engineering plastics, disposable pharmaceuticals, food packaging materials, etc. The rigid cyclohexyl-substituted PCHC with higher glass transition temperature (T_g at about 120 degree celsius), is an advantageous alternative to the degradable material poly propylene carbonate (PPC) in dealing with problems of lower temperature resistance. In this regard, PCHC could be the next generation of CO₂-based copolymer after PPC as the green alternative of polystyrene.

Details of the CO₂-based PHCH preparation pilot project

- Construction nature: New construction
- Construction site: Weibei Coal Chemical Industrial Park
- Project investment: USD6.84 million (RMB48.75 million) in total, 0.57% (=USD39,312 or RMB280,000) of which are for environmental protection
- Site area: 1.26 ha (18.858 mu) of rented plant area, to be shared by this project and a planning polyol project at the same time
- Main construction content: a complete set of equipment capable of producing 100 t/a CO₂-based PCHC
- Production technique: Adopt the self-developed highly-active non-metallic catalysts and use CO₂ and cyclohexene oxide (CHO) as raw materials to prepare PCHC at pilot scale, with carbon fixation rate projected to reach 31%.
- Pilot production experiment design and period: 300 times of experiments in about one year
- Preliminary preparation: By now, the institute's lab has obtained the basic R&D data of catalysts and reaction techniques in bench scale experiments and is basically qualified to enter engineering development.
- Project significance:
 - The project is to obtain optimal technical parametres for PCHC preparation from pilot scale experiments which aim to tackle





down the technical difficulties in industrial production such as raw material pretreatment, polymerisation and devolatilisation, to offer technical foundation for the follow-up industrial projects.

- Once the pilot project completed, the production technologies developed will be introduced to the industrial production with capability of recycling CO₂ that can reduce the exhaust emission from the operation of coal chemical and thermoelectric companies owned by Shaanxi Coal and Chemical Industry Group Co., Ltd. (Shaanxi Coal and Chemical) in the development of green and low-carbon production.

Incorporated in May 2011 with a registered capital of USD491.40 million (RMB3.5 billion), Shaanxi Coal Research Institute is a wholly-owned subsidiary of Shaanxi Coal and Chemical and is mainly engaged in the scientific R&D of industrial production technology and products in the area of coal, chemicals, new energy and new materials, the promotion and application of technological results, and engineering and management consultation. So far, it has built up over 30 pilot-scale and industrialisation experimental production lines in total, forming more than 50 monomer products and over 100 related product items under varied categories such as coal pyrolysis-polygeneration, coal-based fine chemicals, high-end polymers and new energy materials and devices.

Sateri Changzhou's 100,000 t/a Lyocell fibre production line in trail production

Summary: In late Sept., Sateri Changzhou started trail run of the new Lyocell fibre production line with the largest capacity of 100,000 t/a in China.

In late Sept., Sateri (Changzhou) Fibre Co., Ltd. (Sateri Changzhou) announced the start of trail production of the new Lyocell fibre production line with the largest capacity of 100,000 t/a in China, adding that it would keep ramping up its Lyocell fibre capacity to the targeted 300,000 t/a for a firmer status in the green fibre manufacturing.

The 300,000 t/a viscose (Lyocell fibre) by new solvent project is planning to cover an area of 719,225 m² with a proposed investment totalling USD873.85 million (RMB6.22 billion) in construction over 3 phases, each with 100,000 t/a viscose capacity—phase I has been put into production in late Sept., phase II is to begin operation in March 2024, and phase III is in the planning stage without detailed disclosure yet.

Overview of the 300,000 t/a viscose (Lyocell fibre) by new solvent project (phase I & phase II)

- Construction nature: New construction
- Construction site: New Material Industrial Park, Nandu Town, Liyang City, Changzhou City
- Site & floor area: 376,800 m² & 238,952 m²
- Total investment: USD593.19 million (RMB4.23 billion), USD29.37 million (RMB209.20 million) of which are for environmental protection
- Employee quota: 1,200 employees in total, 600 for each phase
- Working system: three 8-hour shifts for 333 days totalling 7,992 hours per year
- Product scheme: 100,000 t/a Lyocell staple fibre for each phase, 2,300 t/a of the total will be used in Sateri's 83,000 t/a spunlace nonwoven fabric and 30,000 t/a nonwoven products project



TABLE 4: Product scheme of the 300,000 t/a viscose (Lyocell fibre) by new solvent project (phase I & phase II)

No	Product	Phase	No. of Production line	Single-line capacity, t/a	Total capacity, t/a
1	Lyocell staple fibre (1.33dtex×38mm)	Phase I	2	50,000	100,000
2		Phase II	2	50,000	100,000
Total			4	100,000	200,000

Source: EIA report of Sateri Changzhou's 300,000 t/a viscose (Lyocell fibre) by new solvent project

Sateri Lyocell is sourced from sustainable plantations with international certifications, utilising the original pulp manufacturing and fibre production technologies with low emission and minimal chemicals usage in production processes. Most of the solvents used are recyclable which effectively decrease environmental impacts. According to the company, Sateri's Lyocell fibre with outstanding dry and wet strength, high uniformity and consistency, and superior quality, has been tested to meet the requirements of STANDARD 100 by OEKO-TEX® and has passed the EU regulation REACH (Registration, Evaluation, Authorization and Restriction of Chemicals).

Incorporated in June 2020 with a registered capital of USD314 million, Sateri Changzhou is the second Lyocell mill of Sateri Group (hereafter referred to as Sateri) part of the Royal Golden Eagle (RGE). Entering into China in 2002 and headquartered in Shanghai, Sateri is the first wholly foreign-owned viscose enterprise in China and the largest renewable viscose producer all over the world. So far, Sateri owns six viscose mills in China with a production capacity of 1.8 million t/a. In May 2020, Sateri's 20,000 t/a Lyocell production line was put into production in Rizhao City of Shandong Province with a 5,000 t/a experimental production line for application technology development of Lyocell. Before then Sateri also announced that it plans to achieve 500,000 t/a of Lyocell in production capacity in 2025.

Shengquan Group to build 100,000 t/a bio-based hard carbon anode material project

Summary: On 16 Dec., Shengquan Group announced plan to invest USD348.19 million (RMB2.48 billion) into construction of 100,000 t/a bio-based hard carbon anode material project.

On 16 Dec., Jinan Shengquan Group Share Holding Co., Ltd. (Shengquan Group, Stock Code: 605589) publicised an announcement that it is to invest USD348.19 million (RMB2.48 billion) into the construction of 100,000 t/a bio-based hard carbon anode material project in adoption of the self-developed biorefinery technology, which would further extend the company's industrial chain, optimise product structure and become the new growth point of the company's business.

Project overview

- Construction site: Chemical Industrial Park of Diaozhen County, Jinan City, Shandong Province
- Proposed investment: USD348.19 million (RMB2.48 billion), of which USD314.08 million (RMB2.24 billion) are for construction, USD13.90 million (RMB99 million) for loan interests, USD20.22 million (RMB144 million) for initial working capital, all from self-fund and bank loan
- Construction content: equipment for process production, storage and transportation facilities, public utilities, auxiliary facilities and service facilities



- Product scheme: 100,000 t/a hard carbon anode materials, 150,000 t/a cellulose pulp, 10,000 t/a nano cellulose pulp, 40,000 t/a nano cellulose, 12,000 t/a furfurals, 10,500 t/a acetic acid and 5,000 t/a sylvine
- Construction period: 18 months
- Construction progress: To date, the project has passed the record filing, expected to finish 10,000 t/a of hard carbon anode materials capacity construction by H1 2023.

The frequently-used precursors for hard carbon are bio-based polymer materials including straw, moso bamboo, coconut husk, starch and walnut shell, also chemical materials like anthracite, asphalt and phenolic resins. As a mainstream anode material for sodium battery, hard carbon features better stability in structure, charging cycle times and safety performance. However, due to the unstable sources for precursors and low compacted density, sodium battery is still an under-developed sector. The successful R&D of hard carbon anode materials that uses straw as raw material by Shengquan Group will help facilitate the industrialisation of sodium battery.

Strengths of Shengquan Group's bio-based hard carbon anode materials

- Bio-based material: Shengquan Group adopts straw as basic material which is low-cost and recyclable to produce biochar (hard carbon precursor); it also can produce high-value-added by-products from straw during the manufacturing, including cellulose and derived products, nano cellulose, furfurals, acetic acid and sylvine. In addition, its self-produced biochar is of high controllability, consistency and stability.
- Product performance: its hard carbon anode materials has high compacted density of above 1.1 g/cm³ boasting combined properties of biomass and resin. The second-generation hard carbon anode materials have passed lab tests that they can achieve a capacity of 330 mAh/g or more, and the first effect can exceed 90%, with improved compacted density.

Founded in 1979, Shengquan Group's business map covers biorefinery, high-performance resin and composites, foundry materials, health and pharmaceuticals, new energy, etc., and is world's leading provider of phenolic resins and furan resins. In H1 2022, the company's sales revenue in biomass industry hit USD44.75 million (RMB318.76 million), up 101.84% YoY. Its one million t/a biorefinery integration project in its Daqing Production Base, with designed processing capacity of 500,000 t/a straw and production capacities of 200,000 t/a cellulose, 25,000 t/a furfurals, 160,000 t/a biochar (lignin derivatives) and organic fertilisers, is in trial production and expected to reach full capacity by Feb. 2023.



Price Update

TABLE 5: Average market prices of major raw materials of bio-based materials in China, Oct.–Dec. 2022

No.	Product	Price, USD/t
1	Sugarcane	169.57
2	Corn	393.90
3	Wheat	448.75
4	Bagasse	42.89
5	Corn cob	70.60
6	Wheat straw	76.91
7	Corn stover	84.31

Source:CCM

TABLE 6: Average ex-works prices of major bio-based materials in China, Oct.–Dec. 2022

No.	Product	Price, USD/t	Remark
1	PHA (Polyhydroxyalkanoates)	8,540	Films
2	PBS (Polybutylene succinate)	5,214	Extrusion grade and injection moulding
3	PPC (Propylene carbonate)	3,966	Injection moulding
4	PLA (Polylactic acid)	3,244	Injection moulding
5	PVA (Polyvinyl alcohol)	2,011	Flocculent
6	Starch-based material	3,080	Film moulding
7	PTT (Polytrimethylene terephthalate)	3,220	Fibre

Source:CCM



News in Brief

Jiangxi Keyuan's 200,000 t/a LA and 130,000 t/a PLA project starts construction

On 28 Oct., Jiangxi Keyuan Bio-Material Co., Ltd. (Jiangxi Keyuan) held the ground-breaking ceremony for its new 200,000 t/a lactic acid (LA) and 130,000 t/a polylactic acid (PLA) project in Jiujiang City, Jiangxi Province. With planned investment of USD418.67 million (RMB2.98 billion) in over two-phased construction summarised as follows, this project uses starch as raw material to produce LA and PLA:

- Phase I: 40,000 t/a PLA (one 30,000 t/a high-gloss pure PLA line + one 10,000 t/a low-gloss pure PLA line), and 100,000 t/a LA
- Phase II:
 - 100,000 t/a PLA (two 50,000 t/a high-gloss pure PLA lines), and 100,000 t/a LA;
 - this phase will also transform the 30,000 t/a high-gloss pure PLA line built in the phase I into a 20,000 t/a low-gloss pure PLA line, thus leading the project's PLA capacities to be 100,000 t/a high-gloss pure PLA and 30,000 t/a low-gloss pure PLA in total.

WOTE signs bio-based polyamide R&D agreement with Chinese Academy of Science

On 7 Nov., Shenzhen WOTE Advanced Materials Co., Ltd. (WOTE) made public its signing of the R&D agreement with the Shenzhen Institute of Advanced Technology of Chinese Academy of Sciences (SIAT) on 4 Nov., to establish a joint innovation centre for synthetic biochemicals application which would be an exclusive joint innovation centre entitled with "synthetic biochemicals application" for SIAT in external cooperation.

Takeaways from the agreement and phased goals:

- WOTE shall pay for R&D expenditure of USD702,001 (RMB5 million) or above in the Joint Centre in 3 instalments within three years after the date of signing.
- Within the cooperative term, SIAT shall complete the agreed-upon technological R&D goals over three phases with the support of WOTE; research results from both sides should be applied and presented on a regular basis to facilitate product innovation and development of technology platform.
 - Phase I: Complete building of biological and combined (biological and chemical) synthesis processes for bio-based polyamide (PA) and bench-scale fermentation process, within 12 months from the date of signing.
 - Phase II & III: Targets and implementation programme will be discussed and specified by both sides based on implementation results from the first phase one month before the phase end.
- More collaboration including but not limited to setting up industrial fund, industrial investing, applying for municipal, provincial or national innovation centres, etc., will be discussed and confirmed in the later period with consideration of this cooperation.

Incorporated in Dec. 2001 with a registered capital of USD31.81 million (RMB226.57 million), WOTE is mainly engaged in the synthesis and modification of high-performance polymer materials and R&D, production, sale and technical service of the end products. SIAT was co-founded by Chinese Academy of Science, Shenzhen municipal government and the Chinese University of Hongkong in Feb. 2006, located in Nanshan District, Shenzhen City of Guangdong Province.

New PLA and PHA projects of Shandong Gaochuang and Hubei Xingchen disclosed

On 27 Oct., 2022, the environmental impact assessment (EIA) of Gaochuang (Shandong) Biomaterial Co., Ltd. (Shandong Gaochuang)'s 100,000 t/a polylactic acid (PLA) project was publicised for the first time. Incorporated in Oct. 2022 with a registered capital of USD9.83





million (RMB70 million), Shandong Gaochuang is founded by Shandong Gaochuang Logistics Co., Ltd., a third-party logistics company owned by Shandong Gaochuang Investment Group Co., Ltd. It mainly engages in R&D, manufacture and sale of bio-based materials and technological R&D of bio-based materials polymerisation.

Overview of the 100,000 t/a PLA project

- Construction nature: New construction
- Construction site: Weifang City High Tech Industrial Development Zone, Shandong Province
- Construction content: New polymerisation workshop with public auxiliary facilities
- Product capacity: 100,000 t/a PLA
- Production process: Use purchased lactide from other companies to produce PLA through lactide ring-opening polymerisation method

On 5 Dec., the EIA report (exposure draft) of Hubei Xingchen Natural Biotechnology Co., Ltd. (Hubei Xingchen)'s 5,000 t/a polyhydroxyalkanoates (PHA) and PLA granule project was publicised. Incorporated in Feb. 2022 with a registered capital of USD702,001 (RMB5 million), Hubei Xingchen is mainly engaged in the manufacture of ecomaterials and technological R&D of bio-based materials polymerisation.

Overview of the 5,000 t/a PHA and PLA granule project

- Construction nature: New construction
- Total investment: USD16.85 million (RMB120 million)
- Construction site: Railway Station Economic Development Zone of Huangzhou District, Huanggang City, Hubei Province
- Construction content: a workshop with drying and refining production lines for PLA and PHA, warehouses, sewage treatment station; fermentation workshop and supporting equipment and facilities
- Project capacity: 3,000 t/a PHA and 2,000 t/a PLA granule
- Production processes:
 - PHA line: microbial synthesis with glucose as raw material
 - PLA line: twin-screw extrusion mechanism, compounding purchased PLA powder into PLA granules
- Labour quota: 60 workers
- Working system: three 8-hour shifts for 330 days per year

Hongye Biotech's 20,000 t/a bio-based THF and 8,900 t/a bio-based methanol project breaks ground

On 28 Sept., Hongye Biological Technology Co., Ltd. (Hongye Biotech) held a ground-breaking ceremony for its new material demonstration project for bio-based polyester materials, detailed as follows:

- Construction nature: New construction
- Total investment: USD49.14 million (RMB350 million)
- Construction site: Nanle County Biomass Energy Industrial Park, Puyang City, Henan Province
- Construction content: Decarbonisation reactor, hydrogenation reactor, shift convertor, pressure swing adsorption (PSA) system, rectifying column, storage tank, 10,000 m³/h hydrogen producing device and other auxiliary facilities
- Product capacity: 20,000 t/a bio-based tetrahydrofuran (THF), 20,000 t/a furan and 8,900 t/a bio-based methanol

Incorporated in Dec. 2008 with a registered capital of USD27.49 million (RMB195.79 million), Hongye Biotech specialises in the research of high value-added utilisation of biomass materials. The company stresses on the development of technology separating three main





components—cellulose, hemicellulose and lignin—from biomass materials like crop straw in a green and efficient way, based on which to manufacture bio-based platform compounds and bio-based composites and research on the achievement transformation. The pilot production of this project has integrated the production of bio-based furan, THF, methanol and ethylene glycol, forming an industrial chain for green manufacture of bio-based chemicals.

Progress of Huafon Group's PTT and PPC projects

On 18 Nov., Huafon Group Co., Ltd. (Huafon Group)'s subsidiary Zhejiang Huafon Synthetic Resin Co., Ltd. (Huafon Synthetic Resin) submitted the record filling to Management Committee of Rui'an City Economic Development Zone for a 30,000 t/a bio-based polytrimethylene terephthalate (PTT) project.

Project details

- Construction nature: Expansion
- Total investment: USD19.66 million (RMB140 million)
- Construction site: Rui'an City, Wenzhou City, Zhejiang Province
- Planned construction period: Nov. 2022–Dec. 2023
- Construction scale: 30,000 t/a PTT with expected yearly output value of USD84.24 million (RMB600 million)

Incorporated in April 2008, Huafon Synthetic Resin is a hi-tech enterprise that specialises in the R&D, production and sale of polyurethane resin products mainly used in polyurethane synthetic leather which has taken up above 22% of the market share in China. The company owns two production bases in Zhejiang and Guangdong provinces. Its revenue reached USD318.71 million (RMB2.27 billion) in 2019.

In addition, according to Huafon Group's announcement on 19 Dec., another subsidiary of the company, Zhejiang Huafon Environmental Protection Materials Co., Ltd., has completed device instalment and commissioning for its 10,000 t/a poly propylene carbonate (PPC) project. With the smooth progress in the 10,000 t/a PPC project, Huafon Group said it will construct the expansion project for 300,000 t/a PPC and modified products and 300,000 t/a polybutylene adipate-co-terephthalate (PBAT), proceeding in green and low-carbon industrial chain.

Bluepha completes trial production of 25,000 t/a PHA project (phase I)

On 28 Oct., Jiangsu Lansu Biomaterial Co., Ltd. (Lansu Biomaterial), wholly-owned by Bluepha Co., Ltd. (Bluepha), completed trial production of the 25,000 t/a polyhydroxyalkanoates (PHA) industrialisation project (phase I: 5,000 t/a), making a critical step toward the next-stage production. The project with proposed investment totalling USD175.50 million (RMB1.25 billion), is planned into two phases. The project is estimated to create an annual sales revenue of USD210.60 million (RMB1.50 billion) and reduce 50,000+ t/a of carbon dioxide emission, conducive to China's goals of reaching carbon peaking and carbon neutralisation.

Details of 25,000 t/a PHA industrialization project (phase I)

- Construction nature: New construction
- Construction site: Coastal Industrial Park, Binhai Economic Development Zone, Jiangsu Province
- Site area: 86,600 m²





- Total investment: USD28.26 million (RMB180 million), 8.3% (=USD23.55 million or RMB150 million) of which are for environmental protection
- Labour quota: 130 new employees
- Working system: 3 shifts, 8 hours per shift, 335 days per year totalling 8,040 hours per year (the processes of bacteria cultivation and initial stage of fermentation (nutrient medium introduction) last for 8,040 hours and the product fermentation, extraction, and granulation processes for 7,920 hours)
- Commencement date: Jan. 2022
- Scheduled capacity: 5,000 t/a of PHA

Karamay to construct 500,000 t/a PLA project

At the end of Sept., Karamay municipal government of Xinjiang Uygur Autonomous Region sealed contract with Huaxia Dadi (Gansu) Biomaterial Co., Ltd. (Huaxia Dadi), investing USD3.79 billion (RMB27.03 billion) in construction of an ecological circulation industrial park in Baijiantan district (Karamay High Tech Zone) over 4 phases. The project, using corn as raw material to produce innovative green products such as modified polylactic acid (PLA) films and special PLA garments, will not only facilitate the development and utilisation of whole corn plant but more importantly fill the capacity shortfall in the biomass-chemicals area in Karamay.

Construction plan:

Phase I: living quarters such as office buildings, R&D centres and dormitories, 400,000 t/a modified PLA films production line and 2 million t/a microbial organic fertilisers production line; construction work to start in March 2023

Phase II: 1.5 million-tonne corn granary, production line for 20 million sets/year special garments and 1.8 million t/a corn straw board

Phase III: production lines for 500,000 t/a PLA, 750,000 t/a lactic acid, 1.5 million t/a commercial corn starch and 75,000 t/a corn germ oil through bio-extraction technology

Phase IV: a logistics park with an annual cargo throughput of 10 million tonnes

Incorporated in Sept. 2020 with a registered capital of USD56.16 million (RMB400 million), Huaxia Dadi is mainly engaged in R&D and production of biodegradable materials, advanced nano materials and the related products, microbial organic fertilisers, soil conditioners and biopesticides. The company has invested and constructed the Huaxia Dadi "Cradle Economy" Ecological Circulation Industrial Park in Zhangye City of Gansu Province with a planned total of USD842.40 million (RMB6 billion)—USD280.80 million (RMB2 billion) of which were allocated to the Phase I construction that broke ground in May 2021. Sub-projects including 1 million sets/year PLA textile garments with special functions project, 30,000 t/a modified PLA materials and the related products project, 200 t/a corn cob-derived graphene project, 200,000 t/a bio-fertiliser and strain breeding project are written down in the park's development plan.



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