

Licensed technologies

Innovative | Proven | Value-adding



We are LyondellBasell – a leader in the global chemical industry creating solutions for everyday sustainable living. Through advanced technology and focused investments, we are enabling a circular and low carbon economy. Across all we do, we aim to unlock value for our customers, investors and society. As one of the world’s largest producers of polymers and a leader in polyolefin technologies, we develop, manufacture and market high-quality and innovative products for applications ranging from sustainable transportation and food safety to clean water and quality healthcare.



A global leader

in polyolefins and chemicals technology, production and marketing



About LyondellBasell

We are LyondellBasell – a leader in the global chemical industry creating solutions for everyday sustainable living. Through advanced technology and focused investments, we are enabling a circular and low carbon economy.

Our Technology business segment develops and licenses chemical and polyolefin process technologies and manufactures and sells polyolefin catalysts.

As the only licensor worldwide offering process technologies for the production of all PP and PE product families, LyondellBasell also provides a comprehensive range of chemical technologies based on in-house manufacturing, product development and process design expertise.

LyondellBasell's technologies are some of the most reliable, efficient and cost effective in the world. With over 350 licensed lines around the globe based on various LyondellBasell technologies, we have an unmatched track record of licensing and know-how transfer that helps our customers to explore new opportunities across the entire petrochemical value chain.

Fast facts

- Vertically-integrated facilities enable conversion of crude hydrocarbons to materials for advanced applications Global reach and scope to compete effectively worldwide
- Five businesses: Olefins & Polyolefins Americas, Olefins & Polyolefins Europe, Asia & International, Intermediates & Derivatives; Advanced Polymer Solutions, Technology
- A technology business that leads its industry in process technology and catalysts
- Combined annual revenues of \$40.3 billion*
- 20 countries with manufacturing sites and joint ventures*

* As of December 31, 2024

Global capacity positions

- Polyolefin Licensing 1st
- Polypropylene Licensing 1st
- Oxygenated Fuels 1st
- Polypropylene 2nd
- Propylene Oxide 2nd
- Polyethylene 3rd

A comprehensive portfolio of licensed technologies

A sustainable competitive advantage

Intense competition, cyclical over capacity and ongoing restructuring are among the many business pressures facing the chemical industry today. LyondellBasell understands that there is no simple formula that meets the needs of each and every company. Our strategic focus is to create innovative polyolefin and chemical products with flexible process technologies which deliver superior performance and cost-effective solutions to meet the changing requirements of our customers.

LyondellBasell offers process technologies and associated services for the entire PP and PE portfolio.

Our customers benefit from LyondellBasell's *Avant* family of polyolefin catalysts and the integrated know-how we have in catalysts, processes and products that enhance your manufacturing capabilities.

Heritage

It began with the polyolefin catalyst discoveries of Karl Ziegler and Giulio Natta, who were awarded the Nobel Prize in 1963. This legacy has continued through five revolutionary generations of *Avant* Ziegler-Natta catalysts to the development of a new metallocene-based polypropylene catalyst, *Metocene*.

These developments have been pivotal in the success of the *Spheripol* PP process and the latest *Spherizone* multi-zone reactor technology innovation.



Pioneering

LyondellBasell pioneered the high-pressure tubular LDPE market with *Lupotech T*, and in 2000 invested in the first world-scale plant in Aubette, France, securing a prosperous future for LDPE. LyondellBasell's *Hostalen* technology, which was first commercialized in 1964 and now produces a globally established product range, has since been further enhanced with the multimodal *Hostalen ACP* configuration for high-end HDPE products.

From the first industrial polypropylene and polyethylene processes to the latest *Spherizone* multi-zone circulating reactor and *Hyperzone* advanced gas phase polyethylene platform, LyondellBasell and its predecessors have delivered state-of-the-art polyolefin catalysts, technologies, and products to customers worldwide.



Licensed polyethylene technologies



Lupotech:

Leading high-pressure tubular and autoclave processes for the production of LDPE and EVA copolymers

- More than 13 million tonnes of total licensed capacity*
- State-of-the-art 420 kt/a single line tubular plant in India
- Wide grade slate, including EVA-copolymers up to 30%
- Low investment costs and low operating costs
- Stable, flexible and optimized operability
- Single-line autoclave capacity 100kt/a and tubular capacity up to 500 kt/a

Hostalen ACP:

Low-pressure slurry process for highperformance multimodal HDPE

- High-performance grades using multimodal HDPE including film, blow molding and pipe applications
- Excellent operability
- More than 10 Mio kt/a *Hostalen ACP* capacity has been licensed globally
- Proven single-line capacities up to 450 kt/a
- Design capacity up to 500 kt/a

Polyethylene catalyst portfolio

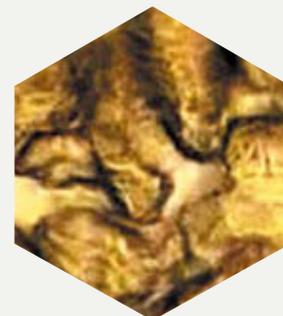
Avant Z

Catalyst of leading bimodal and multimodal HDPE grades in slurry technologies. Controlled morphology catalysts for full range of LLD+MD+HD products in gas-phase technology.



Avant C

Chromium-based catalysts for a broad range of MDPE and HDPE applications in gas-phase technology.



Licensed polypropylene technologies



Spherizone:

Latest-generation polypropylene technology, based on a multi-zone reactor for the production of polypropylene and novel polyolefins

- Nearly 10 million tonnes of licensed capacity
- Multi-zone circulating reactor technology creating bimodal products in single reactor
- Superior and expanded product range including novel and premium products
- Excellent operability
- Optimized investment and operating costs
- Single-line capacity up to 550 kt/a

Spheripol:

Leading polypropylene technology for the production of homopolymer, random and heterophasic copolymers

- More than 35 million tonnes of licensed capacity
- More than 135 licensed lines
- Excellent product range and quality
- Superior operability
- Outstanding investment and operating costs
- Unmatched safety record
- Single-line capacity up to 600 kt/a

Metocene:

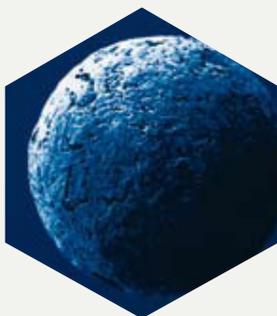
Innovative add-on technology for the production of specialty polypropylene products using single-site catalyst systems

- Implementation into existing and newly built plants
- Technology enhancement for *Spheripol* and other PP processes
- Single-site catalyst chemistry
- Added value products across many applications
- Strong variability of properties within an extended performance range

Polypropylene catalyst portfolio

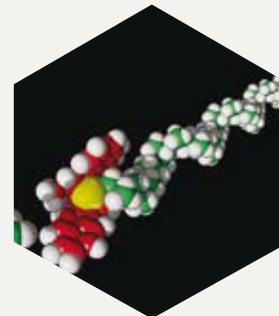
Avant ZN:

Multi-purpose catalysts for a broad range of demanding value applications.



Avant M:

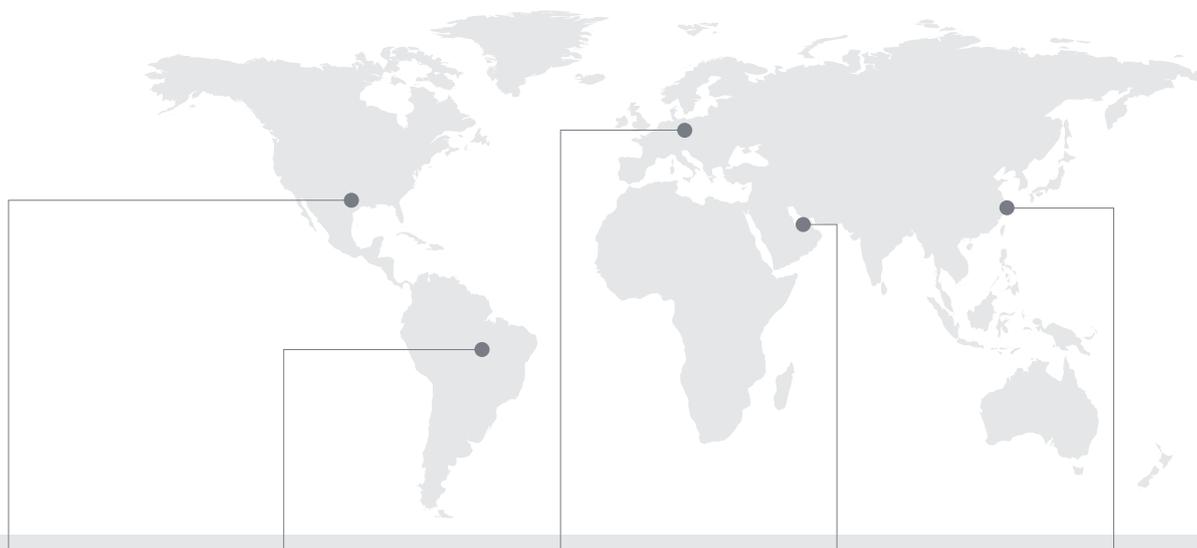
Single-Site catalysts for the production of specialty metallocene polypropylene products.



Polyolefin technologies

Licensee locations

From the world's leading licensor of polyolefin technologies



North America

Lupotech	10
Hostalen	1
Hyperzone	1
Spherizone	2
Spheripol	14
Metocene	1

South America

Lupotech	5
Hostalen	4
Spheripol	7

Europe

Lupotech	23
Hostalen	3
Spherizone	3
Spheripol	31
Metocene	2

AFME

Lupotech	8
Hostalen	15
Spherizone	4
Spheripol	14

Asia Pacific & India

Lupotech	52
Hostalen	43
Spherizone	22
Spheripol	77
Metocene	1

Licensed lines



Technology services



Support

LyondellBasell's Technology Services provide extensive support for licensees before and during start-up, and for the entire life of a plant.

Start-up

Prior to start-up, highly experienced staff at LyondellBasell's training centers (Ferrara, Brindisi, Italy; Bayport, Houston, USA; and Aubette, France) train licensees' operations team on operations, quality control, maintenance, applications and safety.

A start-up team comprised of LyondellBasell operators provides assistance during precommissioning and commissioning of the plant. After completion of the commissioning,

LyondellBasell HSE experts participate in a Plant Safety Audit to verify adherence to LyondellBasell's Safety Design Criteria, with special attention to health and environmental matters.

Sharing

For the life of the investment, LyondellBasell continues to share safety information and enhancements in order to further improve the safety standard of each technology.

In addition, in order to further benefit from LyondellBasell's technical knowledge and developments, licensees can enter into a Technical Support Agreement (TSA) with LyondellBasell. If market conditions change and the capacity of the plant needs to be increased or a variation in

the product grade slate needs to be made, LyondellBasell can assist in the engineering activities needed to upgrade the plant accordingly.

Improvements

We will undertake detailed analysis of your operations and the products that your customers demand. Then we can help identify improvement opportunities and optimize your existing polyolefin assets by leveraging LyondellBasell's extensive worldwide experience in tandem with the special skills of your organization. LyondellBasell Technology Services can help you increase plant utilization, reduce costs, improve product quality and meet your customers' application requirements, while maintaining a strong focus on safety.

Environment and safety

LyondellBasell's core values of environmental protection and the efficient use of resources are demonstrated within our technologies, with a focus on the continual reduction of environmental emissions and waste generation.

Additionally, we have a responsibility to design processes that can be operated safely to protect the employees and communities in which our technologies are operated.

LyondellBasell technologies reflect our "Operational Excellence" philosophy as a basis for achieving superior health, safety and environmental performance through high reliability operations. This in turn helps our customers achieve

measurable improvements within their businesses. Reliable technology and safety are intrinsically linked, and LyondellBasell's technologies have a safety record that is among the best in the chemicals industry. In addition, we have implemented best practice environmental design to create technologies which lead in the industry in the minimization of resource consumption and the prevention of process emissions.

Below are some examples that demonstrate our commitment to Health, Safety and Environment:

Process safety

- Our *Spheripol* process has a track record of nearly seven million hours without a major incident.

- Our *Lupotech* technology incorporates highly effective reactor safety and plant shut down systems to protect the plant.

Environment

- In the design of *Lupotech* technologies, we limit hydrocarbon emissions through selected waste gas streams that are processed using thermal or catalytic catalysts.
- Our *Spherilene* process technology has the most efficient raw material consumption compared to alternative PE processes.

About us

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