Appliance solutions

Making everyday life easier

BOREALIS بروج Borouge

Contents

3 A strong creative partner

7 Your success is our priority

8 Embrace circularity

9 Solutions for appliances

A strong creative partner

Drawing on more than 50 years of plastics expertise, Borealis and Borouge offer innovative materials for appliances that reduce cycle times, enhance processability, and save on energy and materials, all while cutting carbon emissions. By working closely with our partners across the value chain, we can anticipate market needs and address them with targeted solutions, underlining our role as your creative partner.

Typical appliances

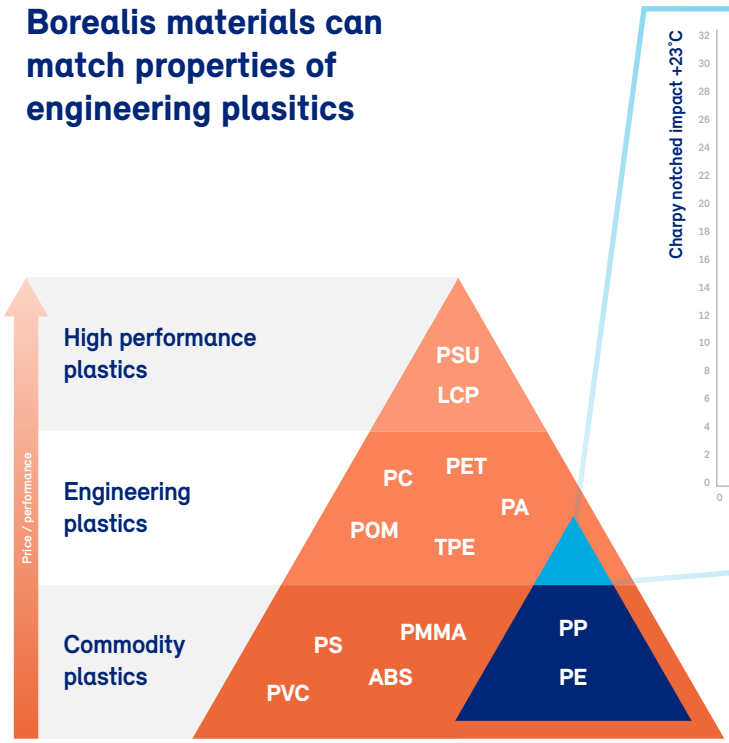
WHITE GOODS

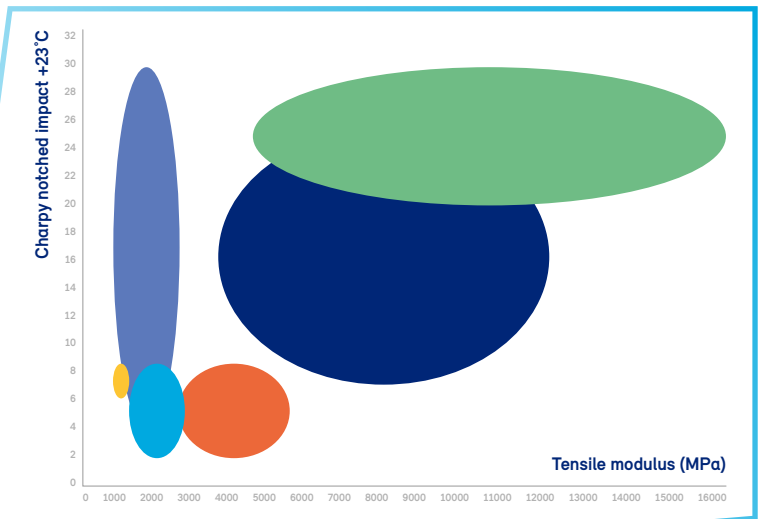
- Washing machines
- Dishwashers
- Fridges
- Freezers
- Dryers
- Air conditioners

SMALL APPLIANCES

- Vacuum cleaners
- Coffee makers
- Ventilators
- Hair drivers
- Microwave ovens
- Power tools
- Water kettles
- Steam irons
- Toasters

Borealis materials can match properties of engineering plasitics





Your success is our priority

In this competitive market, our cost-effective materials help you to stand out. Exceptional design flexibility allows you to create attractive, visually distinctive products, while safety and compliance are guaranteed with our flame-retardant and UL-listed solutions. Simulation and development support enable optimized production, while thorough lab analysis provides quality assurance.

Fibremod™ GB364WG

This chemically coupled, 30% short-glass-fiber-reinforced PP compound replaces metal parts in demanding applications, reducing material use and improving recyclability.

Typical applications
- High-stress parts such as washing machines tubs
- Functional parts including pumps and basements
- Housings

Key advantages
- Replaces stainless steel and PA parts, reducing weight and improving design flexibility and assembly
- Maintains long-term performance, offering excellent stiffness, and impact and corrosion resistance
- Custom-designed for detergent stability
- Offers excellent processability, increased productivity, and energy savings
- UL and food-contact approved
- No moisture absorption, unlike PA

HB601WG

This PP-homopolymer meets high standards for detergent resistance and long-term thermal stability. Suitable for injection molding, it is typically chosen for visible parts due to its excellent surface quality.

Typical applications
- Dishwasher cutlery trays/baskets
- Heat exchangers

Key advantages
- Good processability and colorability
- Good balance of stiffness and impact resistance, even at high temperatures
- Excellent detergent and steam resistance
- High heat stabilization guarantees consistent material performance and dimensional stability
- UL-listed under E108112

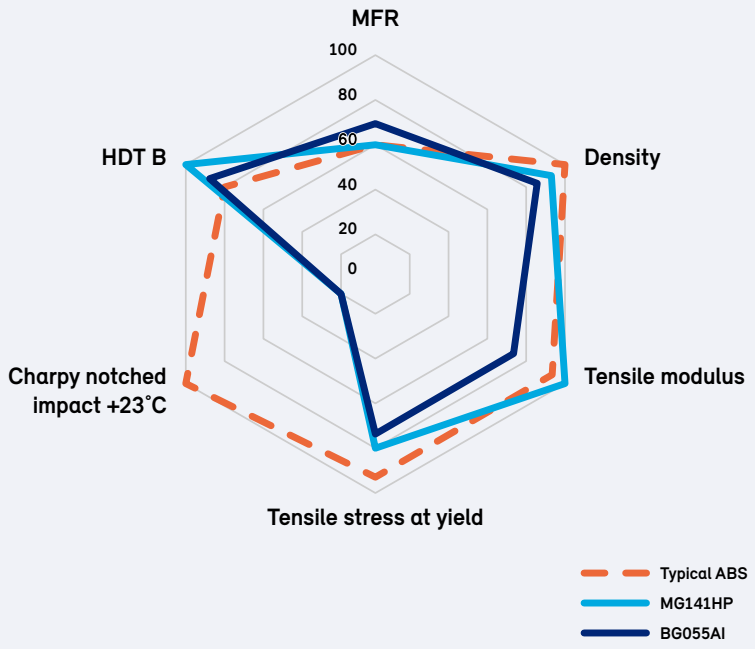
"As one of the leading home appliance manufacturers in the world, BSH stands for values such as innovation, quality and reliability. Therefore we expect from our strategic suppliers, innovative technology, outstanding design, best quality and sustainable products based on a proper material supply and best in class prices."

Michael Borne
Head of Global Commodity Management Resins & Foam, BSH Hausgeräte GmbH

A competitive materials' environment

In the appliances industry, polypropylene (PP), acrylonitrile butadiene styrene (ABS), and polystyrene (PS) are the leading polymers, supplemented by polyamides (PA) 6 and 66, and polycarbonate (PC). Each polymer offers unique benefits, yet PP, in both resin and compound form, is increasingly preferred.

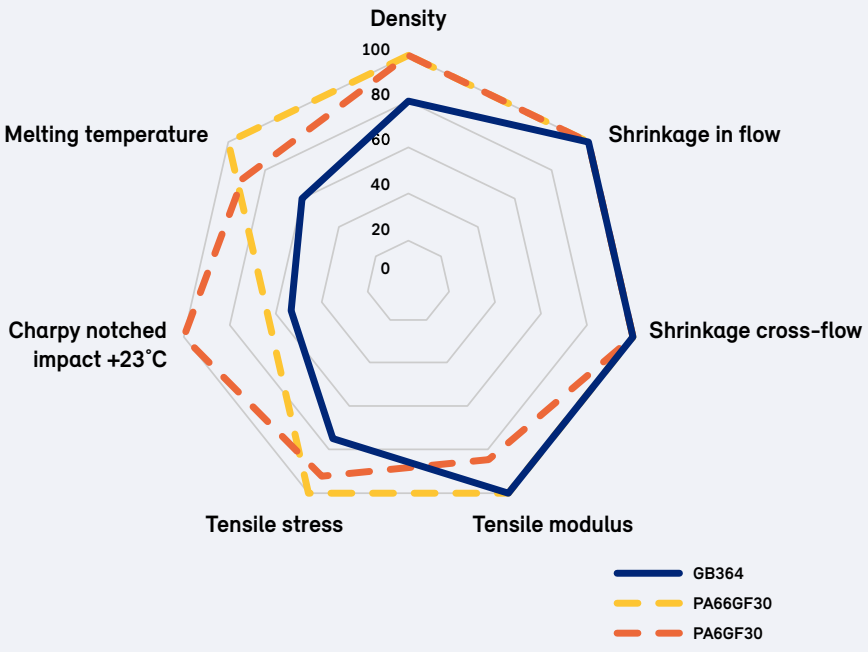
ABS replacement



Benefits of PP

- High performance to cost ratio
- Reduced weight due to low density
- High productivity leading to energy savings
- Low carbon and water footprint
- Excellent balance of stiffness and impact resistance
- Detergent resistant at temperatures up to 95°C
- Good surface aesthetics
- Sound damping properties
- Little or no discoloration over time
- Good chemical and mechanical resistance

PA6 replacement



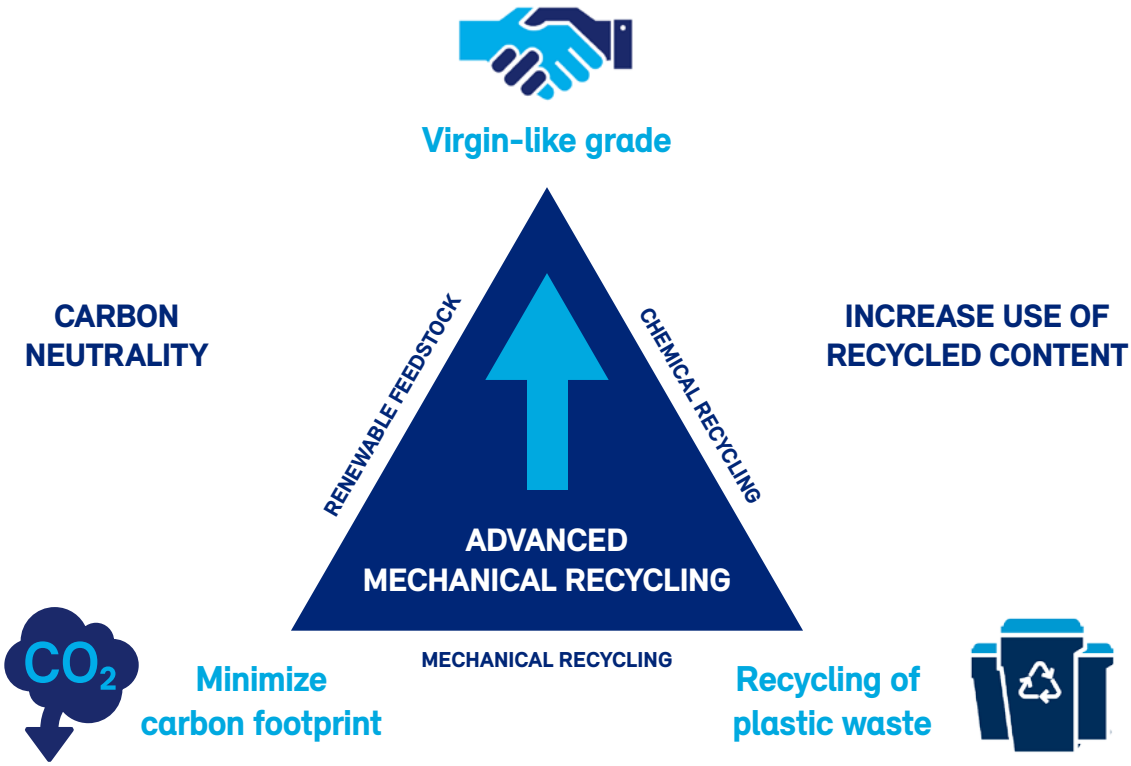
Benefits of PP

- Using PP instead of PA enables a cost saving per part of up to 25%
- Lower raw material purchase price/kg
- Lower volume required due to lower density
- Lower production costs due to ~ 20% energy saving (no conditioning, lower melt temperature)
- Potential CO_2-tax savings, thanks to PP's best-in-class CO_2 footprint

Embrace circularity

Our circular portfolios are here to help you improve the sustainability of your appliances. Borcycle™ M and C are our evolving recycling technologies that transform plastic waste into value-adding solutions for demanding applications. The Bornewables, produced with renewable feedstock derived entirely from waste and residue streams, are premium polyolefins that offer the same material performance as virgin polyolefins. Each portfolio brings a unique balance of advantages, but all contribute to a more sustainable future.

The Magic Triangle: each solution brings different benefits



Borcycle™ MF1981SY

A PP compound with over 80% post-consumer recycled content and around 10% talc. The grade has high impact performance combined with good aesthetic properties. Available in black.

Borcycle™ UF582SA

A PP grade with 55% post-consumer recycled content, suitable for applications requiring high gloss. The grade offers high heat resistance, along with excellent aesthetic properties and good antistatic performance. Available in white and black.

Borycle™ MD4481SY

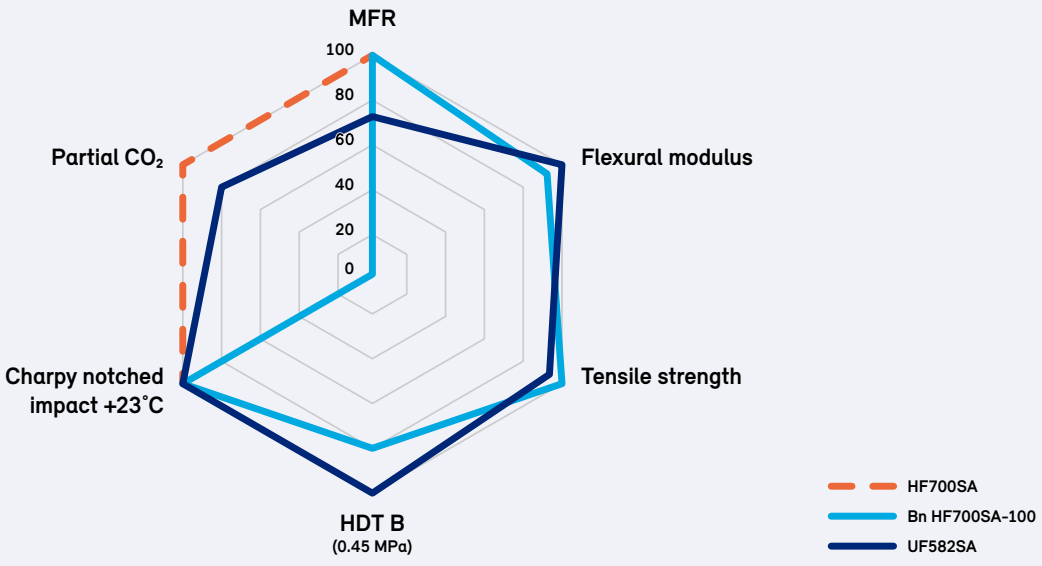
A PP compound with 40% post-consumer recycled content and talc reinforcement. The grade has an excellent balance between stiffness and impact strength. Available in black.

“One stop shop” for fossil and CES solutions

100% fossile grade Fossil based	Borcycle M Advanced mechanical recycling	Bornewables Bio-attributed feedstock	Borcycle C Chemical recycling
Standard Borealis polyolefin solutions and compounds	Closest grade already available or to be developed. PCR content case by case	Standard offering with 50% Renewable content for compounds, 90% for coPP and 100% for homoPP	Standard offering with 50% PCR content for compounds, 90% for coPP and 100% for homoPP
	- **Recycled content** - **CO_2 reduction** depending on PCR content - **Variety of colors**	- **High CO_2 reduction** - Drop in solution with no change in performance - Food statement available	- **High PCR content** - Drop in solution with no change in performance - Food statement available

Sustainable grade replacement of HF700SA

100% fossile grade HF700SA	Borcycle M UF582SA-74	Bornewables Bn HF700SA-100	
No sustainable benefit	55% of advanced Post Consumer Recyclate	100% bio-attributed content	
Partial carbon footprint 1.9 kg CO_2 eg/kg	Partial carbon footprint 1.5 kg CO_2 ea/kg	Partial carbon footprint - 0.2 kg CO_2 ea/kg	
✓		✓	Food compliance
	✓	✓	CO2 reduction
✓		✓	Virgin-like
	✓		Recycled content



Halogen-free flame retardant Polypropylene Compound

Electrical appliances demand materials that ensure safety and prevent severe incidents. Flame retardant properties are essential in such applications, but also defined by the IEC 60335.

With the latest breakthroughs in halogen-free & PFAS-free flame retardant polypropylene, it is time to say goodbye to traditional halogenated flame retardants but also flame retardant engineering plastics and welcome the exciting polypropylene alternatives offered by Borealis.

Our portfolio offers halogen-free and PFAS-free flame retardant compounds with glass fiber reinforcement, ranging from 0% to 30%. Such solution offers a significantly reduced carbon footprint and interesting lightweighting potential.

Density [kg/m²]

Grade name	Application focus	MFR (g/10min)	Glass content (wt%)	GWFI (°C)	Tensile Modulus (MPa)	Charpy NIS 23°C (kJ/m²)	Charpy IS -30°C (kJ/m²)	UL94 rating at ≥ 1.5mm	CTI (V)
FE020HP	Housings, insulation plates, cell holders	12	0	960	2100	3	21.5	V-0	≥ 600
FE121SF	Separation plates, bus bars insulation	14	10	960	3627	7	29.5	V-0	≥ 600
FD221SF	Electronics housing, PCB support	5	25	930	5838	10	40.3	V-0	≥ 600
FF311SF	Module housing, structural components	16	30	960	8540	9	40	V-0	≥ 600

Values determined on standard injection moulded specimens conditioned at 23°C and 50% relative humidity after at least 96 hours storage time.

Solutions for appliances

Grade	Filler content (%)	MFR (g/10 min) PP: 230°C/2.16 kg	Density (kg/m³)	Tensile modulus (MPa)	Charpy impact, notched 23°C (kJ/m²)	UL listed	HDT B 0.45 MPa (°C)	Typical applications/key properties
Homopolymers								
BE50	n.r.	0.30	905	1650	7	✓	95	IM, BM, EXT for white goods. NU, AS.
BE52	n.r.	0.25	900	1600	8	✓	98	IM, BM, EXT for white goods. NU.
HB600TF	n.r.	2	905	1400	4	✓	86	IM, BM, TF for white goods. AS.
HB601WG	n.r.	2	900	1600	6	✓	85	IM, BM for white goods, as dishwashers. High heat stabilzed, detergent resistant. NU, AS.
HE125MO	n.r.	12	908	1550	3.5	✓	88	IM, general purpose grade.
HF955MO	n.r.	20	905	2200	2.5	-	115	IM, BNT, very high stiffness, good transparency and gloss.
HF700SA	n.r.	21	905	1500	2	✓	80	IM for small appliances. High heat stabilized, excellent antistatic performance, high gloss. AS.
Random copolymer								
RE420MO	n.r.	13	905	1100	6	-	75	IM, BM, good transparancy, NU.
RF365MO	n.r.	20	905	1150	5.5	✓	75	Good transparancy and antistatic performance for small appliances, as level indicators. NU, AS.
RF777MO	n.r.	20	905	1100	6	-	72	Good transparency, antistatic performance, BNT, small appliances & white goods
Heterophasic copolymers								
BC245MO	n.r.	3.5	905	1350	15	-	85	IM for small appliances. Good stiffness, impact strength and stress crack resistance. NU, AS.
BC250MO	n.r.	4	905	1200	25PB	✓	80	IM for small appliances. Good stiffness, impact strength, high melt stability and stress crack resistance. NU, AS.
BC612WG	n.r.	5	900	1100	9	✓	70	IM for white goods, high heat and detergent stabilized.
BE961MO	n.r.	12	905	1200	13	-	92	IM for small appliances, good stiffness, high impact strength, BNT, AS
BF970MO	n.r.	20	905	1500	8	✓	102	IM for small appliances, as vacuum cleaners. BNT nucleation to gain high crystaline PP. AS.
BG055AI	n.r.	22	920	2000	3.5	✓	108	IM for white goods with high aesthetical requirements. Excellent gloss at high stiffness level. NU, AS.
BH381MO	n.r.	35	905	1700	6.5	✓	105	IM, BNT, very high stiffness and impact.
Mineral filled								
MG141HP	10	20	980	2500	3.5	-	120	IM for white goods & small appliances, ideal for ABS replacement, high heat stabilized.
MB250WG	20	2.5	1,033	2400	5.5	✓	110	IM for white goods, as dishwasher components, detergent resistant. AS.
MD231U	20	6	1,050	2900	3	✓	125	IM for small appliances and other technical parts. High heat stabilized.
ME212U	20	13	1,050	2900	3	✓	120	IM for small appliances and other technical parts, as heater housings. High heat stabilized. AS.
MB352WG	30	2.3	1,150	3500	4	✓	124	IM for white goods, as dishwasher basement. High stiffness and dimensional stability. AS.
MD441U	40	6	1,220	4200	2.4	✓	100	IM for small appliances and other technical parts, as carriers. High heat stabilized. AS.
ME466WG	40	12	1,190	4100	2.3	✓	129	IM for white goods, white color.
Glass fibre reinforced PP								
Fibremod GB205U	20	2	1.040	4800	11	✓	154	IM for technical parts. High heat stabilized, usable in food and drinking water applications and detergent resistant.
Fibremod GB266WG	20	3.5	1050	5400	10	-	159	IM, Washing machine internal parts, high heat and detergent stabilization.
Fibremod GB364WG	30	2	1,120	6900	12	✓	159	IM for white goods, as refrigerators. Replacement of engineering plastics, like Polyamide. High heat stabilized, usable in food and drinking water applications and detergent resistant.
Fibremod GB366WG	30	2	1,120	6900	12	✓	159	IM for white goods, as washing machine tubs. Replacement of engineering plastics, like Polyamide. High heat stabilized and detergent resistant incl. UL 2157.

Grade	Filler content (%)	MFR (g/10 min) PP: 230°C/2.16 kg	Density (kg/m³)	Tensile modulus (MPa)	Charpy impact, notched 23°C (kJ/m²)	PCR content	Typical applications/key properties
Borcycle™ M PP							
UF582SA	0	15	905	1600	2	55	Suitable for esthetic housing applications, available in white and grey, high gloss, high stiffness.
MF1981SY	10	18.5	968	1250	5	80	IM for small appliances (i.e. vacuum cleaners), good impact, high CO_2 reduction.
MD2550SY	20	5	1080	2500	3.3	50	IM for appliances, available in black, high heat.
MD4381SY	40	6	1270	4100	2	30	IM for small appliances and white goods, high stiffness and dimensional stability, high heat.
MD4481SY	40	9	1275	4100	2	40	IM for small appliances and white goods, UL94 listed, high stiffness, dimensional stability, high heat.
GD3600SY	30	6.5	1140	6300	8.5	68	IM for appliances, available in black, high CO_2 reduction, high stiffness.

Polypropylene MFR
(230°C/2.16 kg) g/10 min = ISO 1133

BNT = Borstar® Nucleation Technology, giving highly nucleated polypropylenes with excellent dimension consistency, regardless of color pigments, and a high potential for cycle time reduction and lightweighting.

SA = slip agent
AS = antistatic agent
NU = nucleating agent
PB = partial break
IM = injection moulding
BM = blow moulding
EXT = extrusion
TF = thermoforming

For more information about our consumer products visit
borealisgroup.com/industries/consumer-products

For more information about Borcycle M solutions visit
borealis.solutions/borcyclemsolutions

Contact us
borealisgroup.com/contact

Borealis and Borouge appliances solutions are making everyday life easier

date of issue: **June 2024**

Borealis is one of the world's leading providers of advanced and sustainable polyolefin solutions. In Europe, Borealis is also an innovative leader in polyolefins recycling and a major producer of base chemicals. We leverage our polymer expertise and decades of experience to offer value-adding, innovative and circular material solutions for key industries such as consumer products, energy, healthcare, infrastructure and mobility. .

With operations in over 120 countries and head offices in Vienna, Austria, Borealis employs around 6,000 people. In 2022, we generated a net profit of EUR 2.1 billion. OMV, the Austria-based international oil and gas company, owns 75% of our shares. The Abu Dhabi National Oil Company (ADNOC), based in the United Arab Emirates (UAE), owns the remaining 25%.

In re-inventing essentials for sustainable living, we build on our commitment to safety, our people, innovation and technology, and performance excellence. We are accelerating the transformation to a circular economy of polyolefins and expanding our geographical footprint to better serve our customers around the globe. Our operations are augmented by two important joint ventures: Borouge (with ADNOC, headquartered in the UAE); and Baystar™ (with TotalEnergies, based in the US).

borealisgroup.com | **borealisveminds.com**

Borealis AG
Trabrennstr. 6-8, 1020 Vienna, Austria
Tel +43 1 22 400 000 · Fax +43 1 22 400 333
borealisgroup.com

Borouge Pte Ltd Sales and Marketing Head Office
1 George Street 18–01, Singapore 049145
borouge.com