

Artificial Grass



**YARN
CHEMISTRY
IS OUR
FIELD**

Total Polymers Europe, technological leader

A CUTTING-EDGE EXPERTISE IN POLYMERS

Polymers are used in a variety of products that enhance our daily lives. At Total, we have been working for more than half a century with our customers to develop **innovative, high-performance polymers**. Our product development focuses on making **plastic solutions lighter, more durable and greener** by exploring renewable feedstock sources.

POLYETHYLENE TECHNOLOGY DEVELOPMENT FOR ARTIFICIAL GRASS

Polyethylene monofilaments revolutionized artificial turf pitches by providing **higher softness and a more natural look**. Combined with Total's Lumicene® and Lumicene Supertough® technology, it also provides fields with **fibers of excellent resilience and unrivaled durability**.

FROM NYLON TO LUMICENE®

2010
TOTAL
LUMICENE® mPE



Softness



Durability



Processing



Temperature
resistance

1990s
LLDPE



Softness



Natural feel



Natural look



Durability

1970s
PP



Durability



Cost



Injuries

1960s
NYLON (PA)



Durability



Cost



Injuries


ARTIFICIAL GRASS

Pioneer in technology for linear polyethylene

OUR RESINS ACHIEVEMENTS

Our solutions are
2x MORE DURABLE
than other existing grades

Unrivaled
RESILIENCE
performances

LOWER PRESSURE
build up

20% FASTER
A very high linear line speed

OUR EXPERTISE IN YARN DESIGN AND PERFORMANCE

Developing the best yarn for a given application means finding the **optimal balance between durability, haptics, and resilience**. Let us partner with you to create a yarn formulation to achieve this in perfect harmony with your machinery and shape design.

THE HAPTICS
provide a pleasant touch
and prevent injuries



DURABILITY
resistance to degradation
under heavy use



RESILIENCE
to prevent premature
flattening of the field



Our contribution to the market



The Padel Club Belgium

We developed a new surface for Padel, in collaboration with Beaulieu International Group.

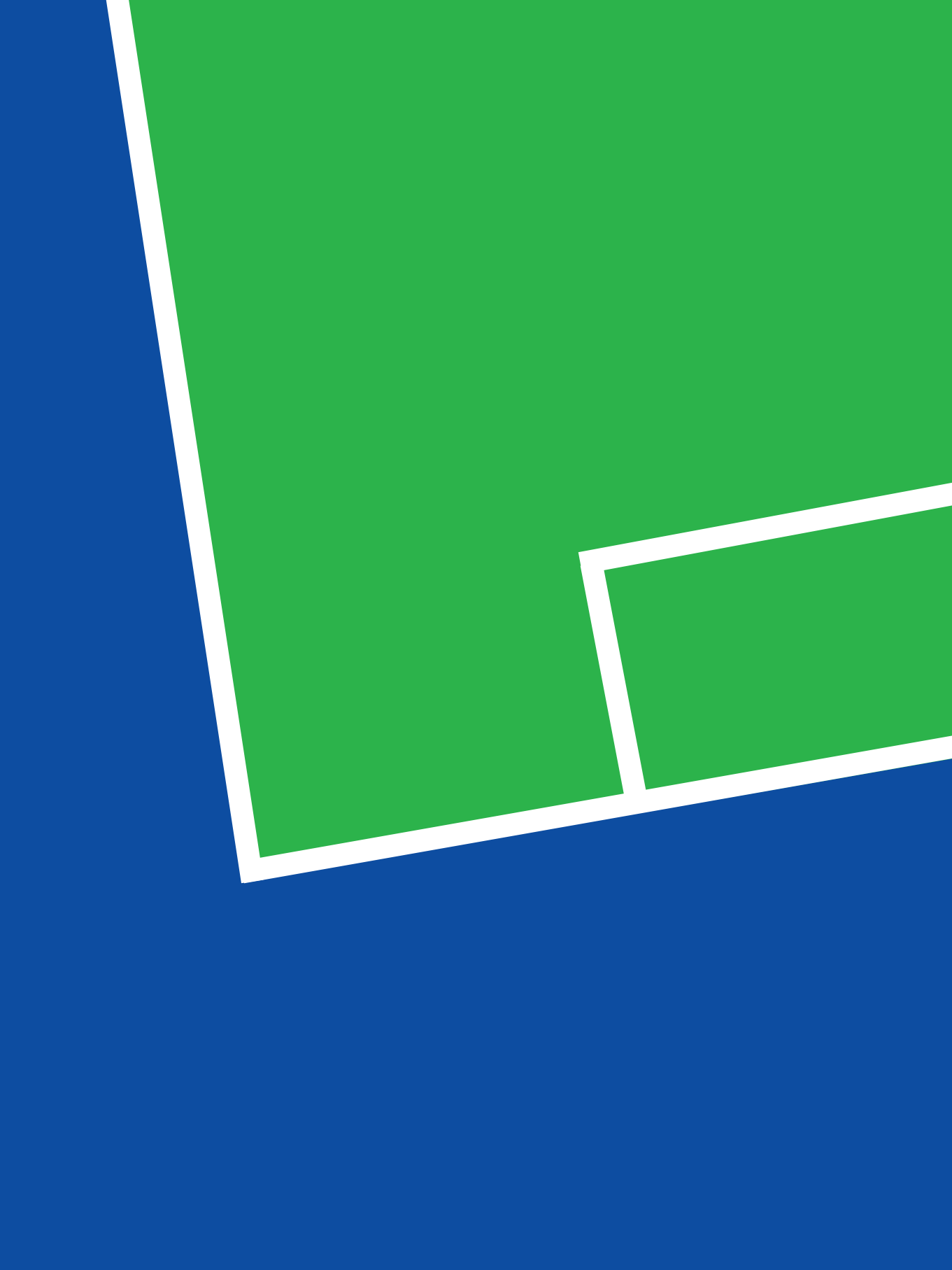
This emerging sport, combining aspects of tennis and squash, is extremely demanding on the yarn in terms of abrasion by the sand infill. The new yarn based on our Lumicene® PE enables our installation partner Padel Club Belgium to guarantee a surface that lasts two times longer than alternative ones, whilst pitch owners get a significantly higher return on investment.



ESTO membership

Total has been an associate member of ESTO and its technical committee since 2009 and is **active in both yarn and sustainability technical working groups.**

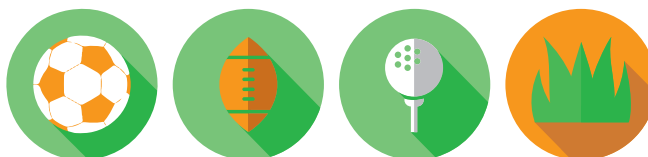




A complete portfolio

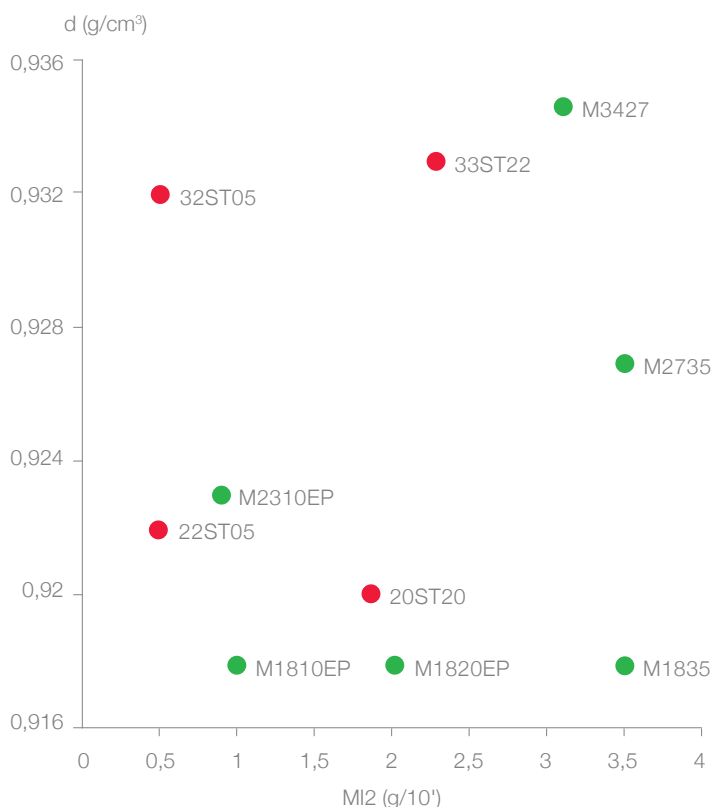
KEY PRODUCTS

Our **extensive product portfolio** allows yarn manufacturers to **fine tune yarn performance for any application**, be it football, rugby, golf or your backyard.



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CONTACT SPORTS		
Supertough 20ST20	0,920	1,8
Lumicene® M1820EP	0,918	2,0
Lumicene® M1835	0,918	3,5
NON CONTACT SPORTS		
Supertough 33ST22	0,933	2,2
Lumicene® M2735	0,927	3,5
Lumicene® M3427	0,934	3,1
PPH 3060		
LANDSCAPING		
Supertough 20ST20	0,920	1,8
Supertough 33ST22	0,933	2,2
Lumicene® M1835	0,918	3,5
Lumicene® M2735	0,918	3,5
Lumicene® M3427	0,934	3,1
PPH 3060F		1,8
PPH 4060		3,0
BACKING		
PPH 3060		1,8
PPH 4060		3,0
SHOCKPAD		
LDPE CD0230	0,922	2,0

YARN DESIGN AND PERFORMANCE



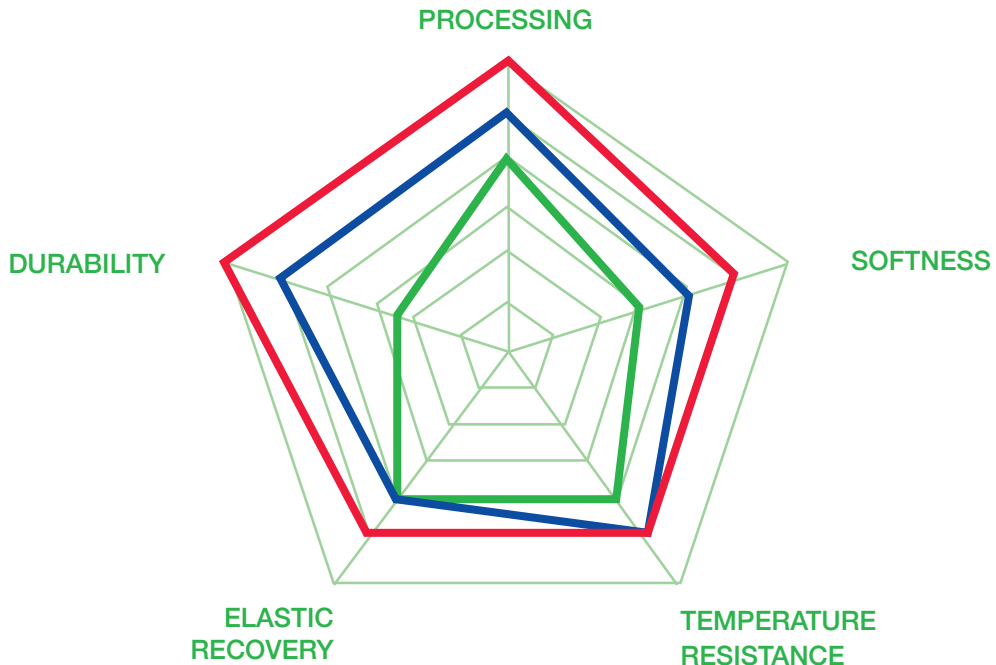
- Lumicene®
- Lumicene Supertough®



OUR TECHNOLOGIES

LUMICENE® POLYETHYLENE is made with Total's proprietary metallocene catalyst technology. Compared to conventional metallocene PE, Lumicene® PE can be processed faster, provides higher durability and features improved resilience.

LUMICENE SUPERTOUGH® grades are based on the combination of the Lumicene® catalyst technology with Total's proprietary production process. These high performance resins allow us to reach hitherto unknown levels of performance whilst allowing converters to reach maximum line speeds.





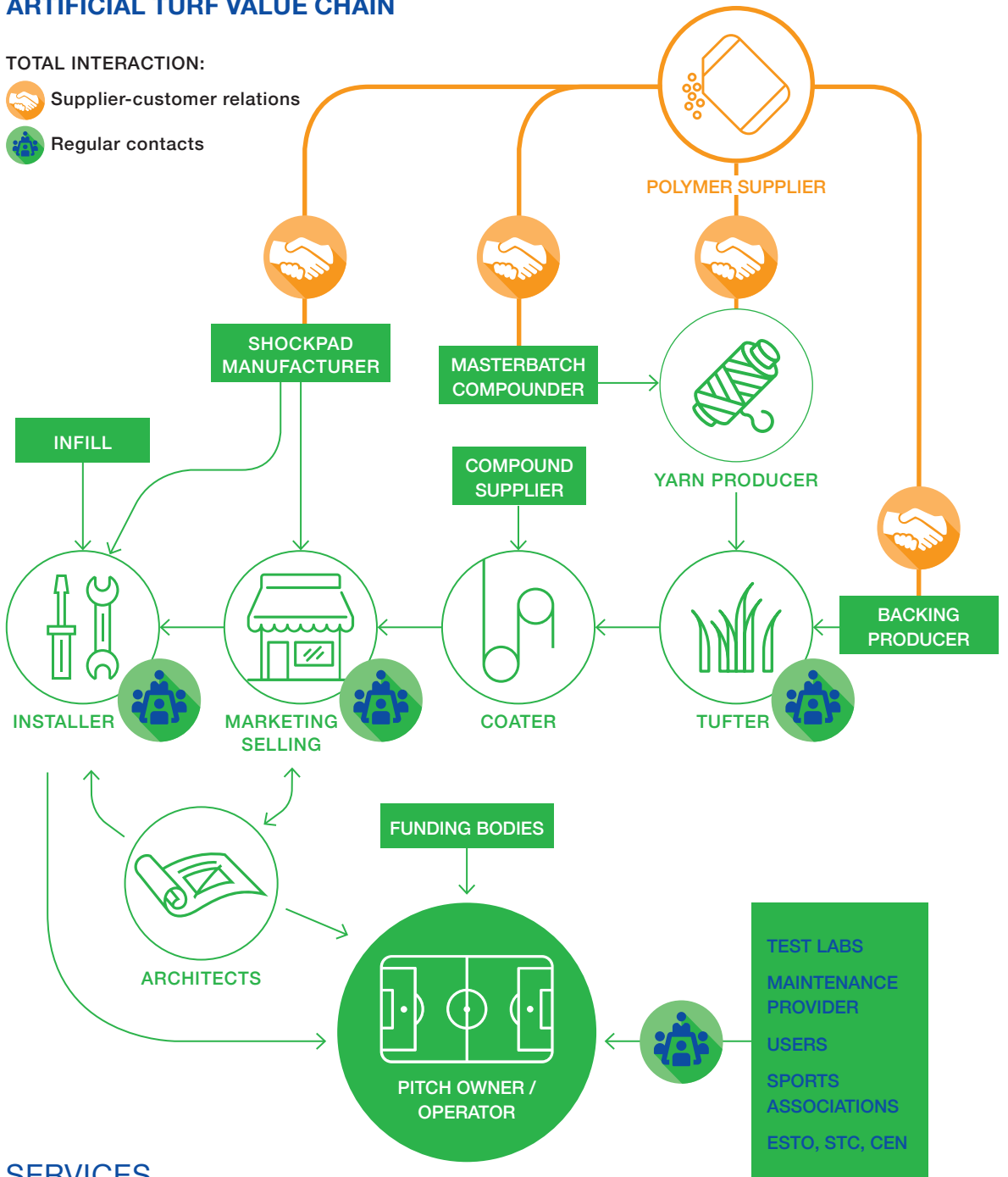
— Lumicene Supertough®
— Lumicene® technology
— LLDPE-C8 technology



ARTIFICIAL TURF VALUE CHAIN

TOTAL INTERACTION:

-  Supplier-customer relations
-  Regular contacts



SERVICES

Beyond our primary role (supply of PE and PP raw materials), we regularly meet tufters, installers, pitch owners, sports associations, machine manufacturers, test labs and many others, to enable our products to contribute to this chain optimization.

A sustainable approach

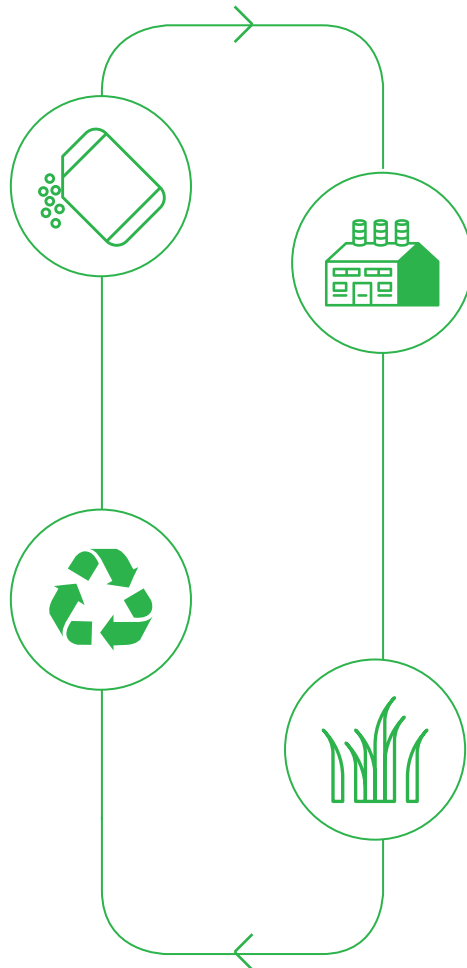
Total is active throughout the sustainable development chain. As for our polymers activity, we focus on **innovation** to develop both **recycling and renewable solutions**.

RAW MATERIAL

We invest and innovate in our feedstock sourcing to produce either drop in polymers (PP, PE, PS) with less carbon emission impact through a mass balance approach, or full biopolymers.

END OF LIFE TOTAL'S INTERNAL RESOURCES TO DEVELOP RECYCLING SOLUTIONS

As more and more artificial turf pitches reach their end of life, putting these used materials to good use is a high priority for Total. We have already demonstrated with our circular compounds for blow molded detergent bottles that post consumer recyclates (PCR) can be turned into a valuable resource. We are currently working with recycling companies to extend this approach to artificial turf pitches.



PRODUCTION

Total's global petrochemical division, signatory to the Responsible Care® Charter, commits to implementing and promoting good management practices in hygiene, health, safety, environmental performance, stakeholder relations and security. We signed the Clean Sweep® pledge and have implemented measures to prevent plastic pellets from being released into the environment.

PRODUCT USE

LABEL ECOSOLUTION:

Leveraging innovation to serve continuous improvement, the Total Ecosolutions program involves developing products and services that enable our customers to improve their environmental footprint. Lumicene® M3427 provides artificial grass yarns with a lifetime of at least 50% longer.

 **33%** REDUCTION IN GREENHOUSE GAS EMISSIONS CONSUMPTION

 **33%** REDUCTION IN ENERGY CONSUMPTION





total.com

Total is a major energy player committed to supplying affordable energy to a growing population, addressing climate change and meeting new customer expectations.

Those commitments guide what we do. With operations in more than 130 countries, we are a top-tier international oil and gas company and a global leader in solar energy through our affiliate SunPower. We discover, produce, transform, market and distribute energy in a variety of forms, to serve the end customer.

Demonstrating their commitment to better energy, our 100,000 employees help supply our customers worldwide with safer, cleaner, more efficient and more innovative products and services that are accessible to as many people as possible. Our ambition is to become the responsible energy major.



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