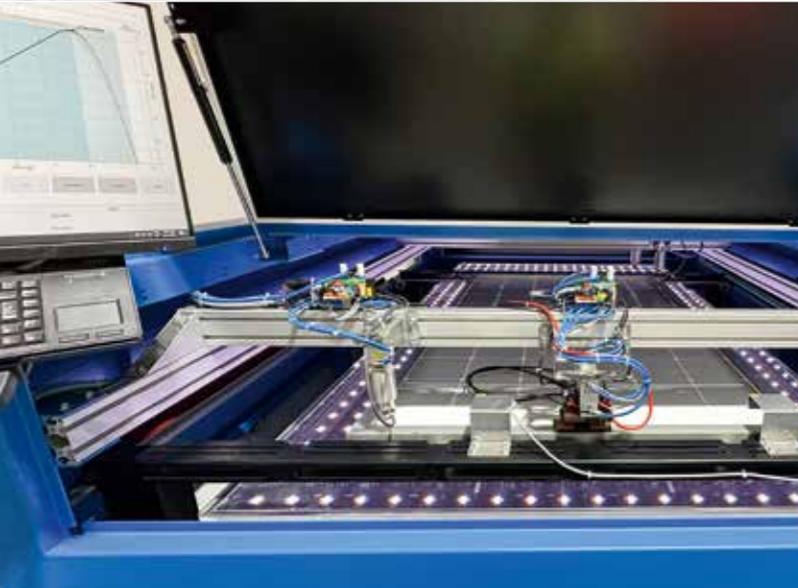




# PHOTOVOLTAIC RECYCLING



# FACTS



## REILING – WITH US YOU CLOSE THE LOOP

**The Reiling Group is one of the leading recycling specialists in Germany for glass, plastic, wood, photovoltaic modules, and much more. The production and marketing of foam glass gravel and Revitro are also part of Reiling Group's portfolio.**

As a family-run recycling company, we have been committed to the conservation of natural resources as well as environmental and climate protection for more than 100 years by returning valuable raw materials to their cycles.

Nowadays, photovoltaics is a key component in the concept of renewable energies because this form of electricity generation conserves resources and saves CO<sub>2</sub> emissions. However, the service life of photovoltaic modules is limited – at present to approx. 20 to 30 years.

Due to the enormous growth rates, a disposal volume of several million tonnes is expected in Germany by 2050. In addition, many companies want to replace their still functioning modules with more powerful models at an early stage.

At our competence centre for PV recycling in Münster, we offer our B2B customers an all-round recycling solution: testing for reuse, PV recycling and transport services.



ALL-IN-ONE SOLUTION  
FROM A SINGLE SOURCE



HIGHEST COMPETENCE  
AND EXPERIENCE



RESOURCE CONSERVATION  
AND ENVIRONMENTAL  
PROTECTION



ECONOMIC EFFICIENCY



LEGAL COMPLIANCE



COMPREHENSIVE TESTING  
AND CERTIFIED RECYCLING  
(ELEKTROG)



MAXIMUM  
TRANSPARENCY



RECYCLING CERTIFICATES  
FOR EACH MODULE



HIGH TESTING AND  
RECYCLING CAPACITIES

# YOUR RECYCLING SOLUTION



## PV RECYCLING AND TESTING FOR REUSE

**We offer our B2B customers an all-round recycling solution from a single source: testing for reuse and PV recycling.**

From module manufacturers, EPCs, solar park operators, operation and maintenance service providers, installers and businesses to distributors and collection systems - as one of the largest and most experienced photovoltaic recyclers in Germany, we are happy to support you with a simple, legally compliant, and individual all-round solution.

We accept all types of silicon-based PV modules at our 5 ElektroG-certified locations in Germany. The modules are tested and/or recycled at our new and also Germany's first exclusive PV recycling site in Münster.



## THE ALL-ROUND RECYCLING SOLUTION

As an environmentally conscious PV recycling company, we not only want to offer our customers optimal solutions, but also make a maximum contribution to the conservation of resources.

Therefore, our all-round recycling solution for the disposal of your PV modules consists of two components: testing for reuse and/or recycling (ElektroG compliant). Depending on the requirements

and condition of the PV modules, they are either professionally tested for reuse as second-life modules or directly sent for recycling.

Thus, a disposal solution can be created that is resource friendly as well as economic and transparent for you. To maximize transparency and legal certainty, test protocols and recycling certificates are provided to comply with legal obligations.

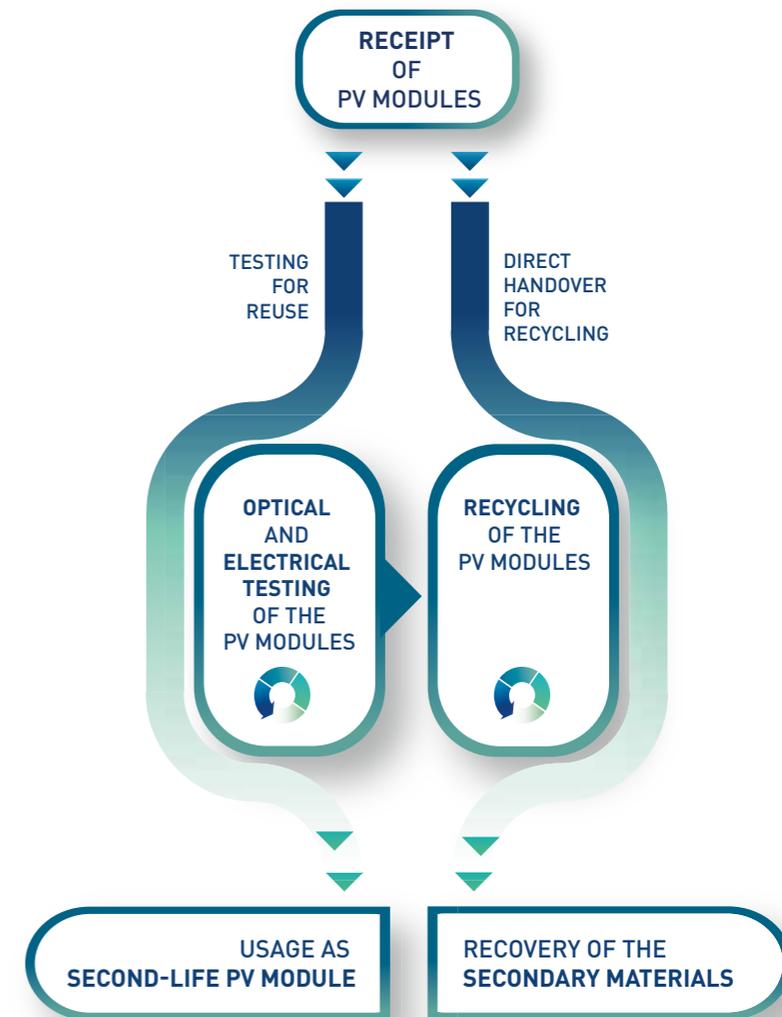
We also carry out the quantity reports to the EAR foundation. In addition, we have a nationwide transport network to assist you in the best possible way with the collection of the modules.

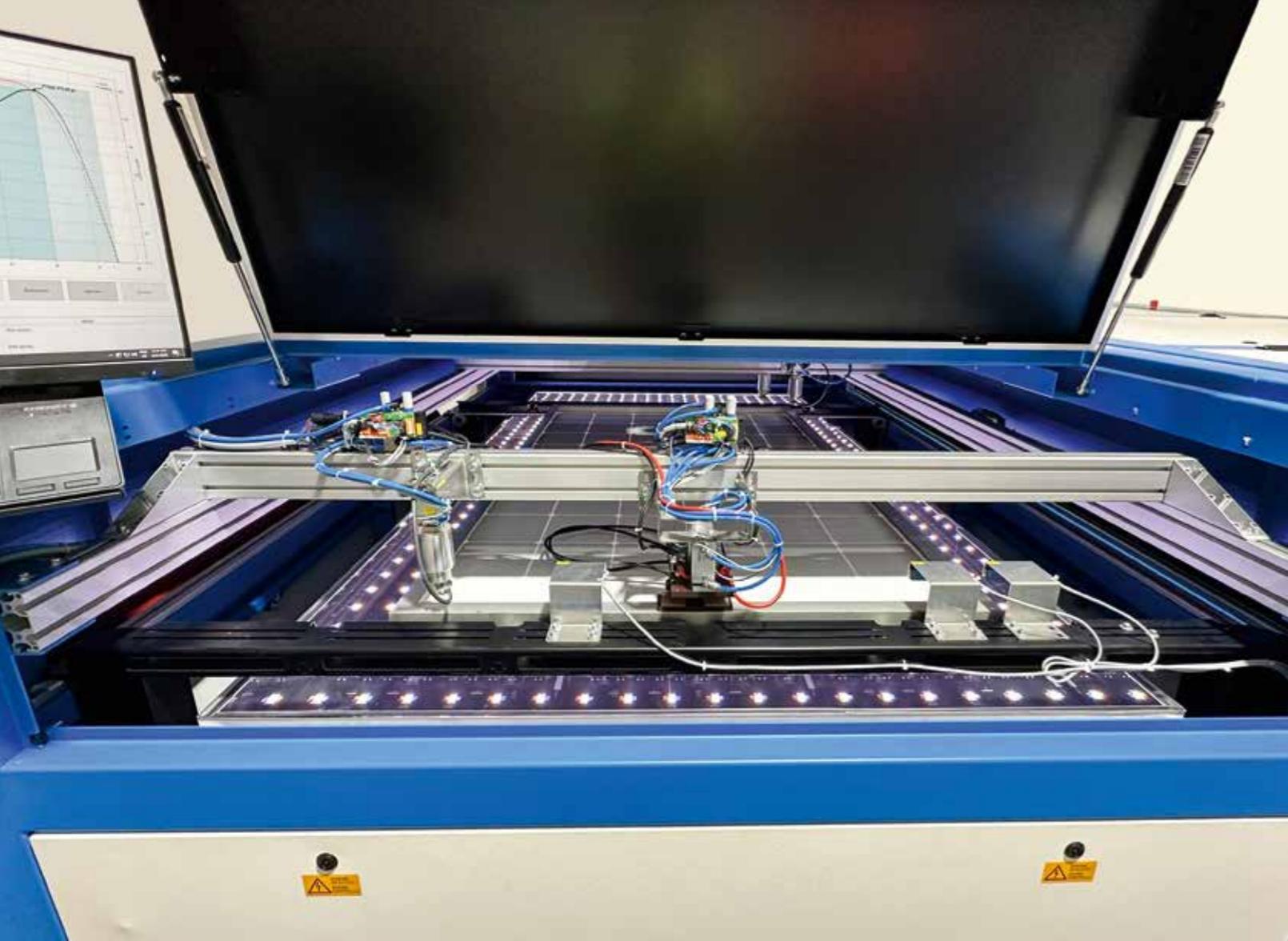


## WE COLLECT, TEST AND RECYCLE

With more than 15 years of experience in PV recycling, we dedicate ourselves to this task with the highest level of commitment and professional know-how.

We support module manufacturers, EPCs, solar park operators, operation and maintenance service providers, installers, distributors, businesses, and collection systems.





# TESTING FOR REUSE

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**ECONOMIC. SUSTAINABLE.  
LEGAL.**

The vast majority of installed PV modules are still intact after more than 10 years of use. However, a significant reduction in performance is often noticeable.

If the modules that are still in working condition are to be replaced with more efficient modules, for example in the course of an active solar park repowering, the recovery path of reuse is preferable to recycling.

By using them as second-life modules, the used resources can be conserved. To follow this simple sustainability principle, testing for reuse is the first part of our individual EOL concepts.

Visually undamaged PV modules are subjected to various test procedures to fully check their performance and electrical safety. If the test results are positive, the PV modules are reused or, if they do not pass, they are directly sent for recycling. Thus, every reused second-life module is fully tested and test reports are issued.



## OUR TESTING METHODS

- Optical testing
- Power measurement (determination of residual module power with TÜV-certified flasher)
- Electroluminescence testing (detection/assessment of micro-cracks and connection failures in the solar cells)
- Tests to ensure electrical safety (Bypass diode test, HiPot test, insulation resistance test, grounding test)

# RECYCLING OF PV MODULES

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## SIMPLE. LEGAL. ENVIRONMENTALLY FRIENDLY.

Photovoltaic modules that are not suitable for reuse are processed in our multi-stage recycling process.

The recovery of valuable module components by type is a major challenge in photovoltaic recycling. With more than 15 years of experience, we dedicate ourselves to this task with great commitment and the highest level of technical know-how. Thanks to the continuous further development of our in-house

developed and highly specialised recycling process as well as the use of state-of-the-art technologies, we are able to separate and process the materials efficiently.

As a certified primary treatment facility, we guarantee legal disposal as well as the best possible results – together with reliable partners – and meet the highest quality standards.

## OUR ENDPRODUCTS



### Best possible quality for our customers.

After our recycling process we get the following end products:

- glass (coarse grain and fine grain)
- silicon
- aluminium
- conductors (tinned copper)
- cables
- foil



## OUR END PRODUCTS

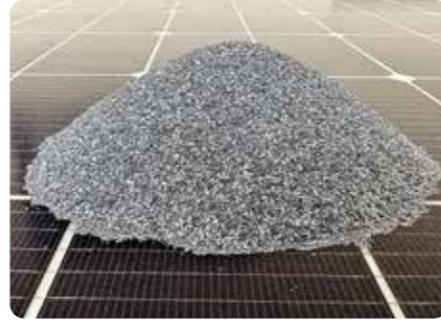
After our recycling process we get the following material fractions:



*Glass coarse grain*



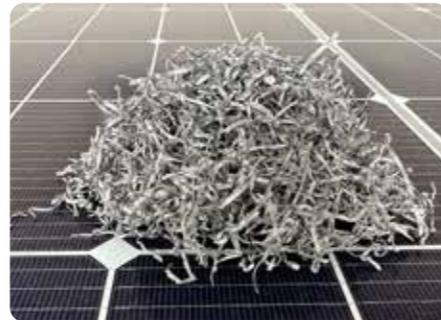
*Glass fine grain*



*Silicon*



*Aluminium*



*Conductors (tinned copper)*

# HIGHEST QUALITY

## BEST POSSIBLE QUALITY FOR OUR CUSTOMERS

We can offer our customers secondary raw materials of high purity and quality.

Glass, as the main component of PV modules, is the predominantly recovered secondary raw material. However, other materials such as aluminium, conductors and cables are also efficiently recycled and returned to high-quality applications. Thanks to a joint, innovative research project with the Fraunhofer Center for Silicon Photovoltaics CSP, we also succeed in recovering the silicon.

Through our innovative recycling solutions, we will remain a strong and reliable partner for our customers in the future.



## RIGHTS AND OBLIGATIONS

Since 2015, PV modules in Germany have been subject to the ElektroG, which regulates the disposal and recycling of modules.

This includes, among other things, various reporting and take-back obligations for PV module distributors as well as the requirement that only certified primary treatment facilities may recycle modules.

This is intended to ensure the return of the valuable but firmly bonded raw materials that are built into PV modules.





# MÜNSTER

## PV RECYCLING COMPETENCE CENTRE

PV recycling competence centre Münster – the first Reiling photovoltaic recycling site in Germany.

In June 2023, we fully commissioned our newly built PV recycling site in Münster, where we operate the collection, testing for reuse and recycling of silicon-based PV modules.

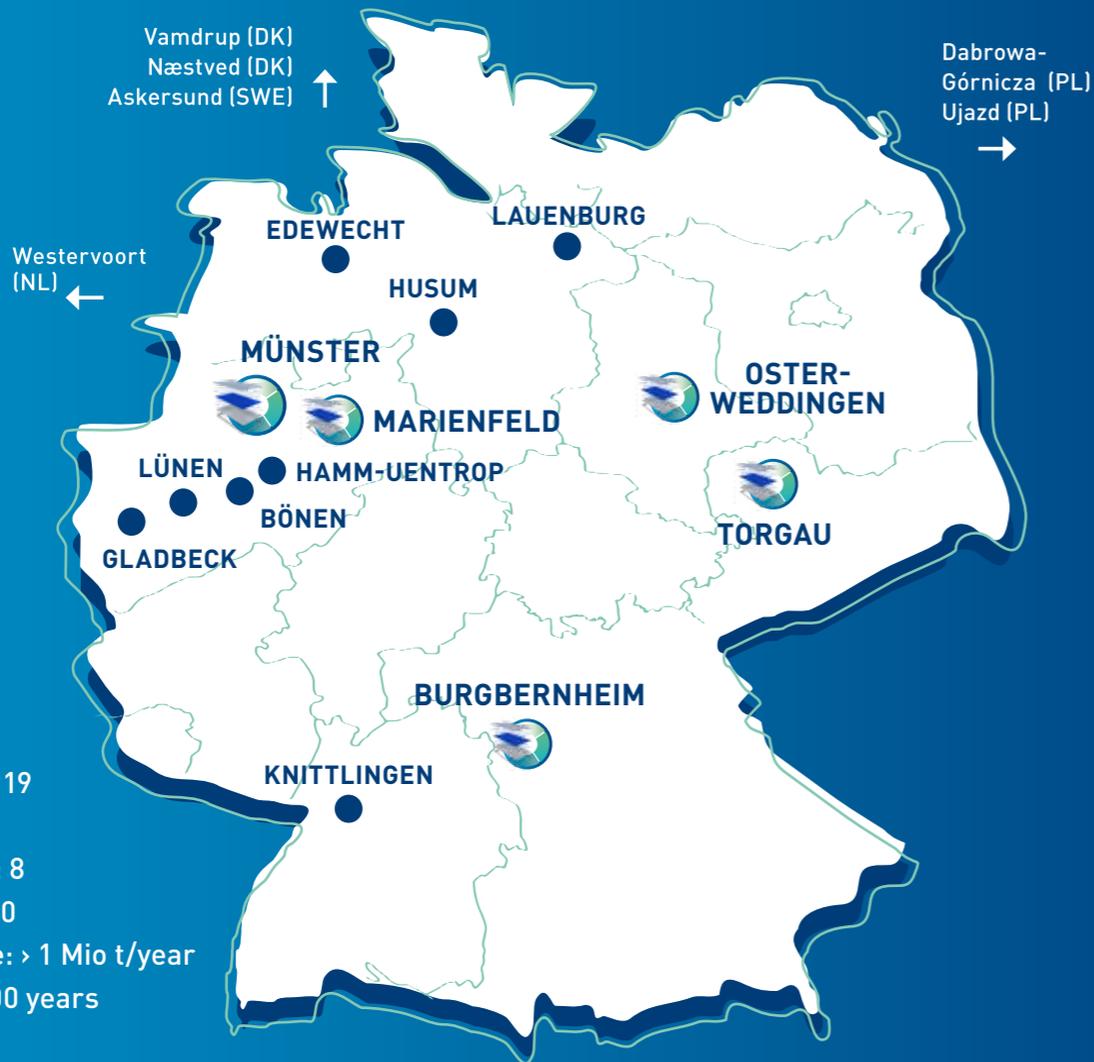
Due to the pure PV focus and the con-

sistent design of the site to the defined process flows, an optimal and highly efficient recycling of the delivered PV modules can be guaranteed.

In addition to the test line, the focus is on the innovative and in-house developed PV recycling plant. Particularly with regard to the recycling plant construction, the technologies used and the process

sequence, it was possible to draw on the experience, expertise and research results gathered over the past 15 years.

The mechanical recycling process enables us to offer our customers secondary raw materials of high purity and quality and we are optimally prepared for the disposal volumes expected from Europe in the future.



Locations total: 19  
 Locations PV: 5  
 Business areas: 8  
 Employees: > 650  
 Quantity volume: > 1 Mio t/year  
 Experience: > 100 years



# LOCATIONS PHOTOVOLTAIC

## Competence centre PV recycling and testing for reuse:

Reiling PV-Recycling GmbH & Co. KG  
 Hessenbusch 180 • D-48157 Münster  
 E-mail: [pv.recycling@reiling.de](mailto:pv.recycling@reiling.de)  
 Phone: +49 251 32706458

## Acceptance of PV modules:

Reiling PV-Recycling GmbH & Co. KG  
 Hessenbusch 180 • D-48157 Münster

Reiling Glas Recycling GmbH & Co. KG  
 Bussemasstraße 49 • D-33428 Marienfeld

Reiling Glas Recycling GmbH & Co. KG  
 Appendorfer Weg 4 • D-39171 Sülzetal (Osterweddingen)

Reiling Glas Recycling GmbH & Co. KG  
 Solarstraße 15 • D-04860 Torgau

Reiling Kunststoff Recycling GmbH & Co. KG  
 Im Grund 13 • D-91593 Burgbernheim

## Contact:

E-mail: [pv.recycling@reiling.de](mailto:pv.recycling@reiling.de)  
 Phone: +49 251 32706458

FAMILIAL  
SOCIAL

INNOVATIVE  
FUTURE-ORIENTED

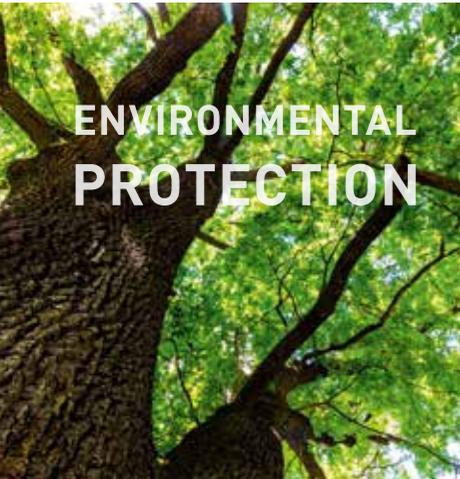
COMPETENT  
GROUNDED

RESPONSIBLE  
FAIR

CONSCIOUS  
ECO-FRIENDLY



# VALUES OF REILING GROUP



## ENVIRONMENTAL PROTECTION

### Sustainability equals the future to us.

*This is what we at Reiling Group are committed to. We see environmental and climate protection as an important task and take this into account in all corporate decisions.*

*Protecting the environment and using natural resources sparingly depend on the commitment of every single employee and are firmly anchored in our business policy and corporate philosophy. We also rely on renewable energies in the company as far as possible. Our innovative combined heat and power plants for generating energy and heat and our photovoltaic systems for generating our own electricity are practical examples of this. Similarly, a smart energy management system demonstrates our sense of responsibility towards the environment and the efficient use of resources (DIN ISO 50001 certification).*

# TRUST

## CERTIFIED DISPOSAL SECURITY

We represent quality and reliability. However, we never leave good enough alone. We are our own strictest auditors in order to continuously improve and always meet the qualitative and legal requirements. We also submit to audits by external certifiers at regular intervals.

**We are DEKRA certified:**  
Quality management to ISO 9001  
Disposal specialist operation  
Energy management to ISO 50001



RECYCLABLES MANAGEMENT. RECYCLING.  
WITH US YOU CLOSE THE LOOP.



Headquarter Reiling Group, Marienfeld.



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