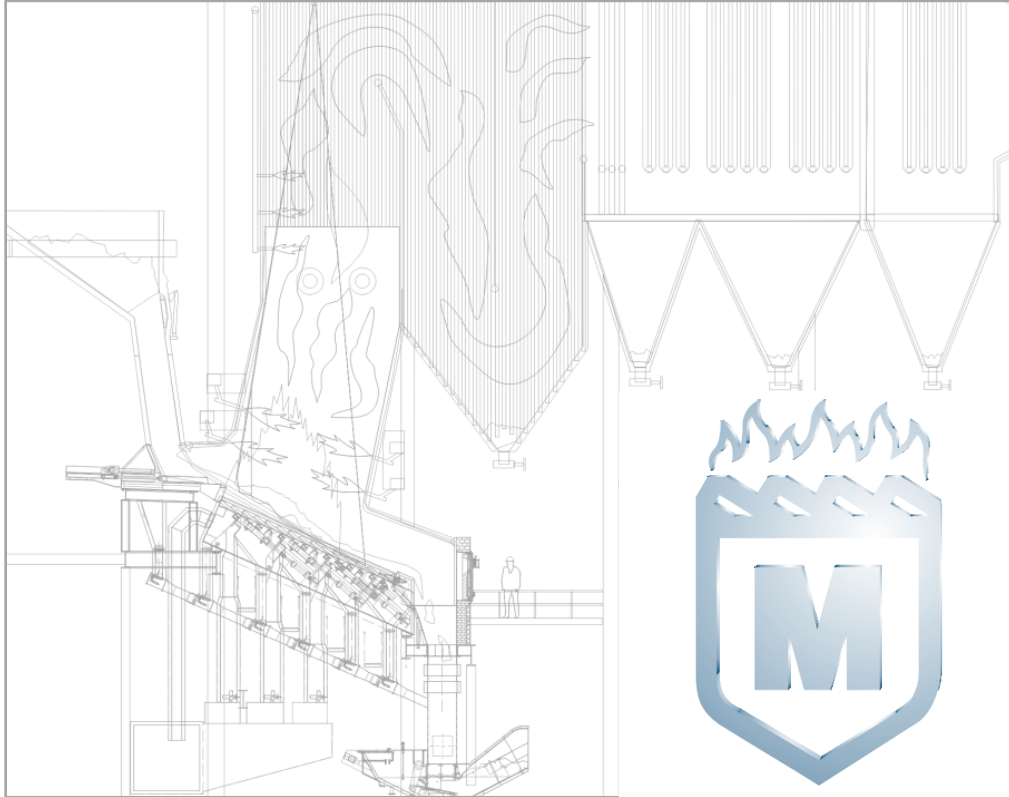


Topics driving us and our systems

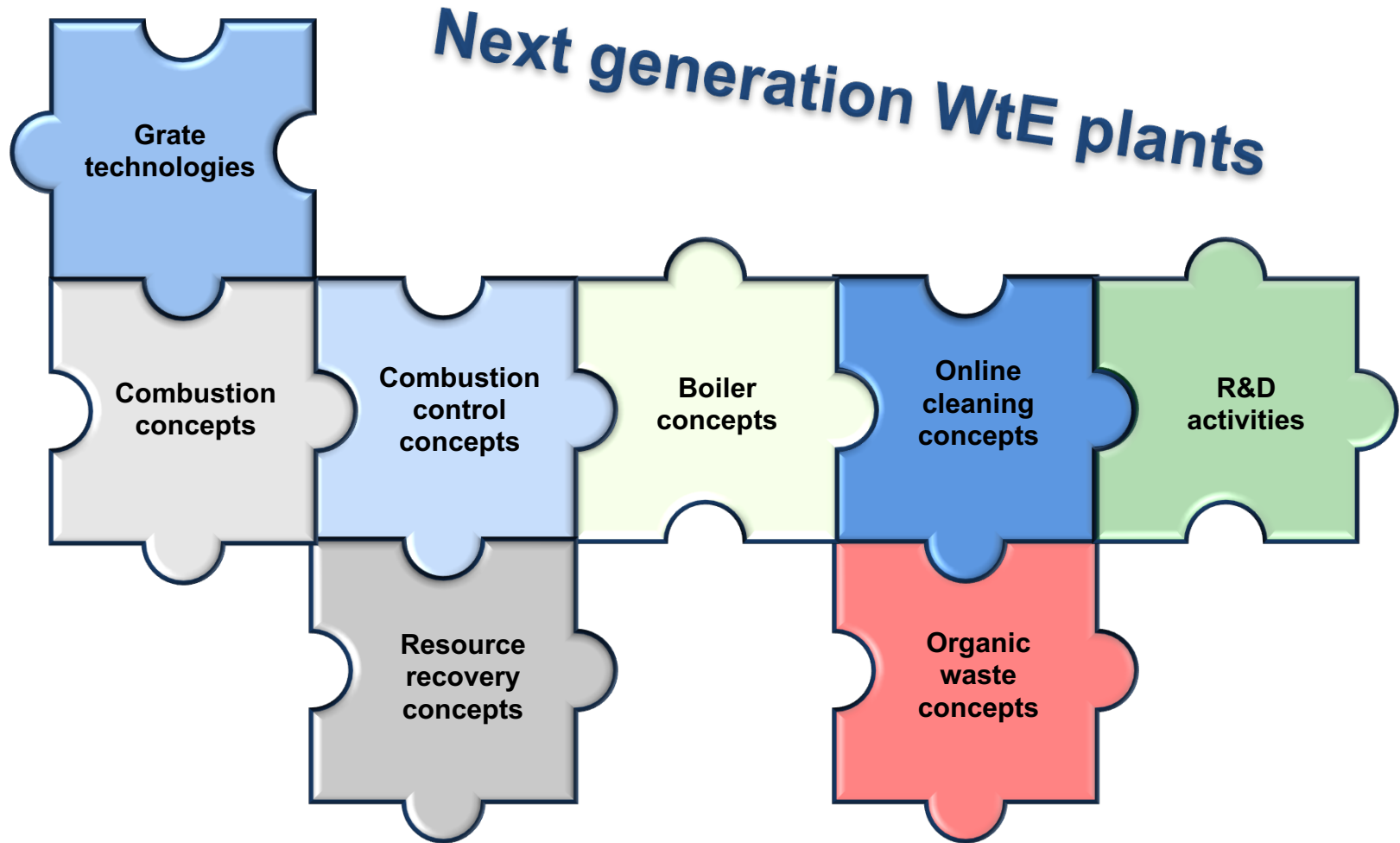


MARTIN technologies for the future



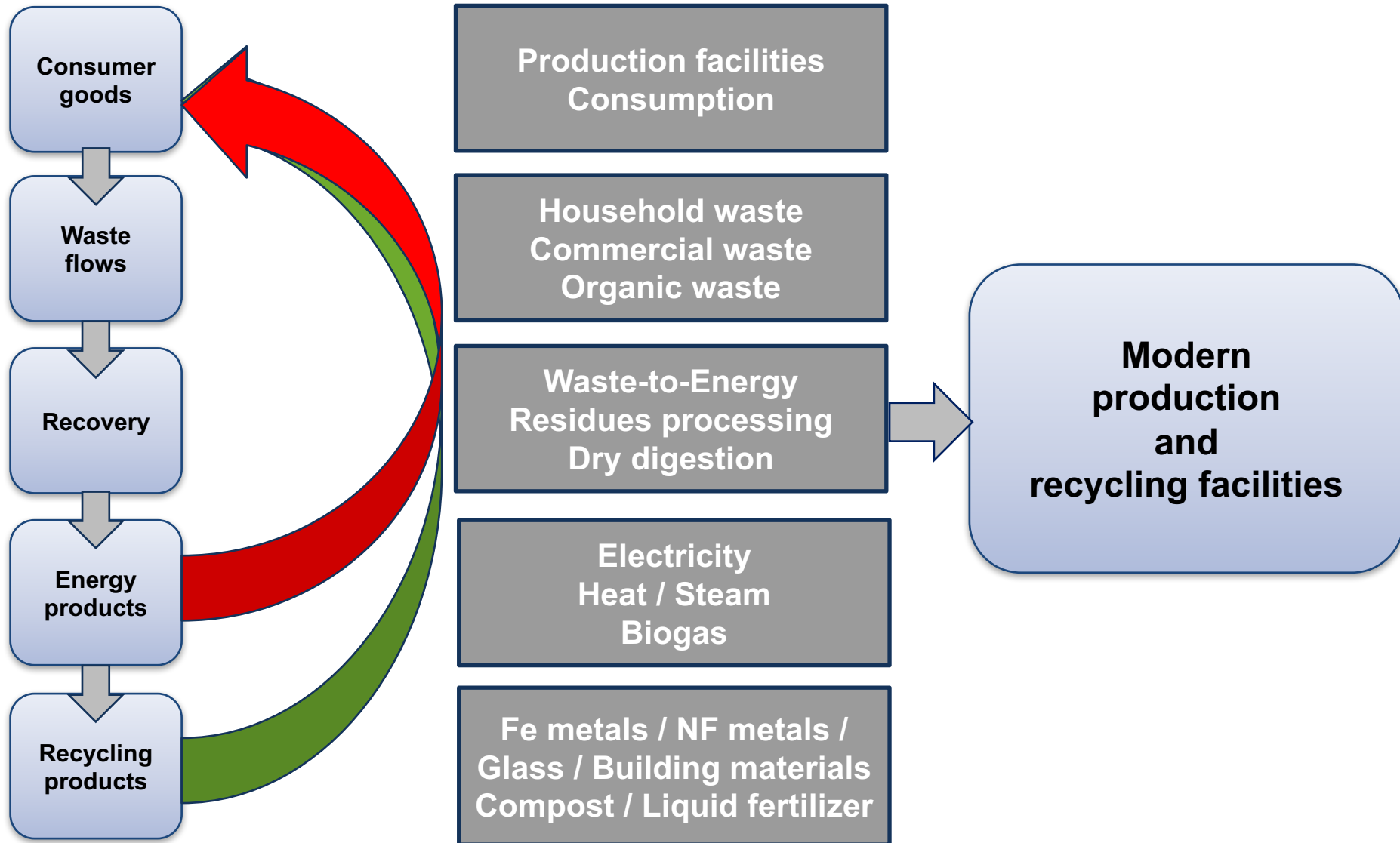
MARTIN
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Circular Economy

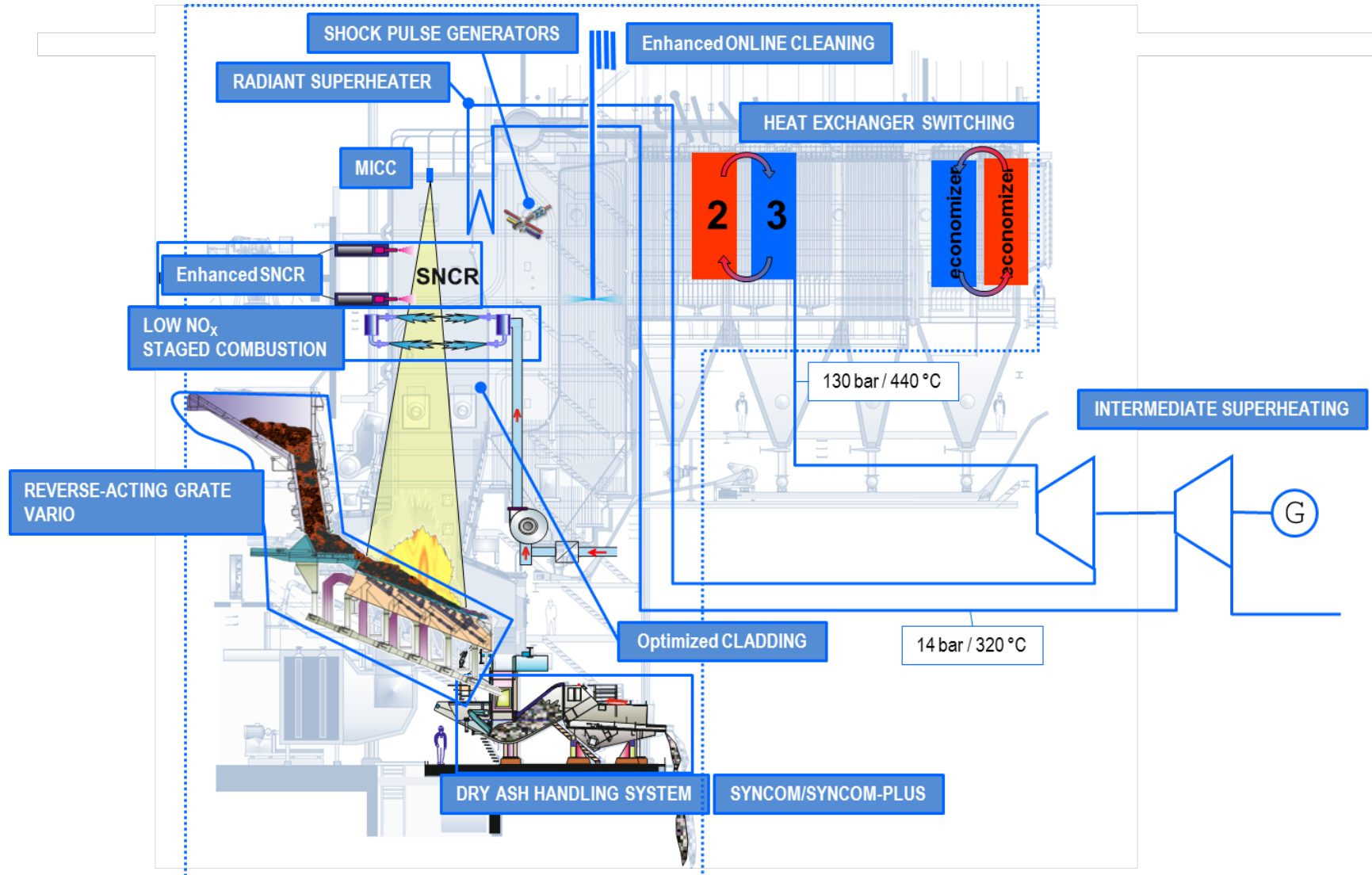


Conclusions / Future prospects

Circular Economy



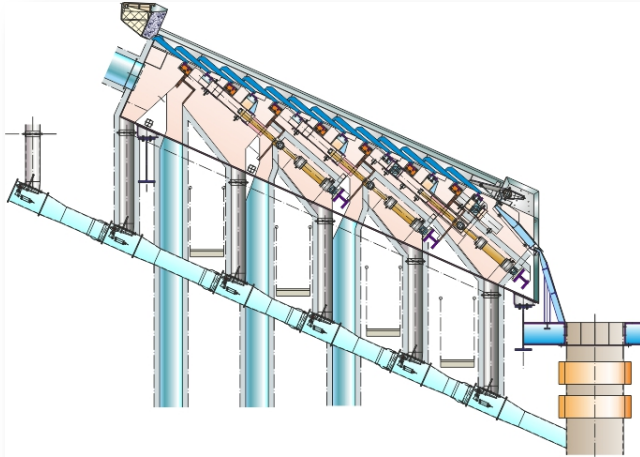
Next generation WtE plants



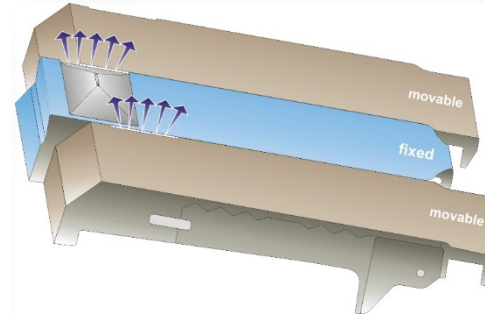
Grate technologies

Reverse-acting / horizontal types

Reverse-acting grate Vario

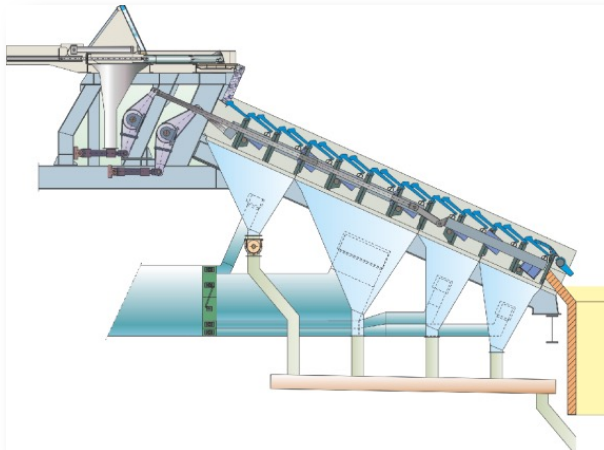


Reverse-acting grate bars

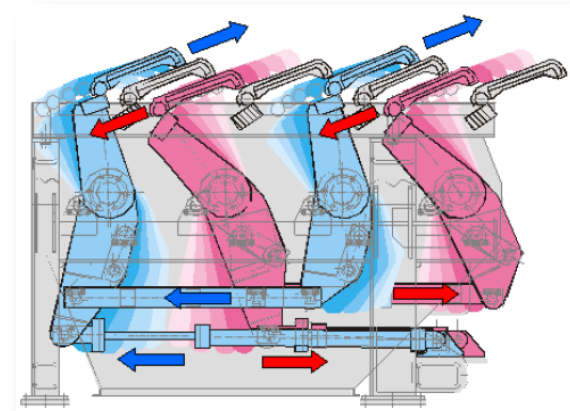


**Highly reliable
also for fuels with
high heating values**

Reverse-acting grate SITY 2000

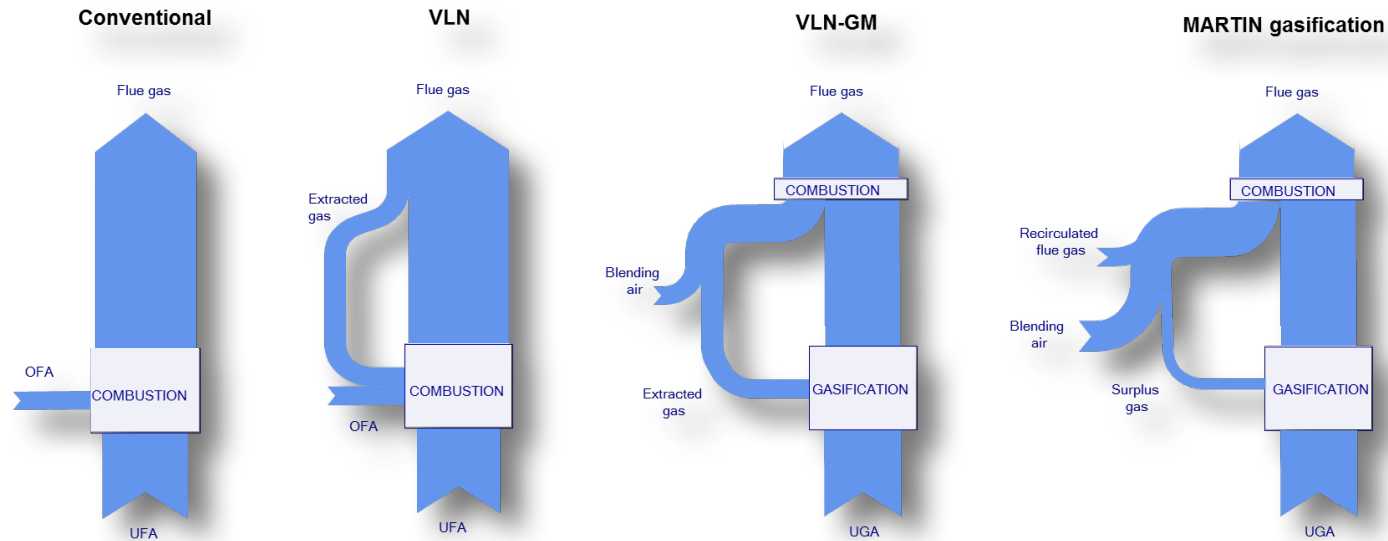


Horizontal grate

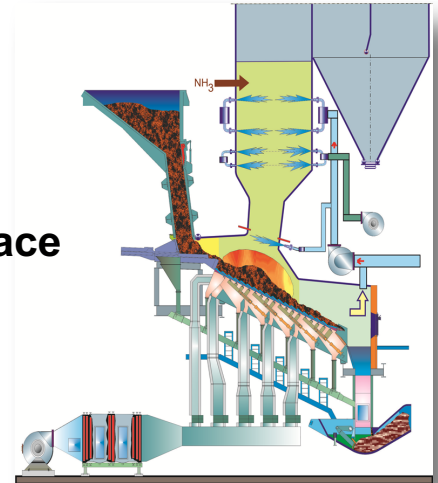


Combustion concepts

Conv. / VLN / VLN-GM / Vario Gas System



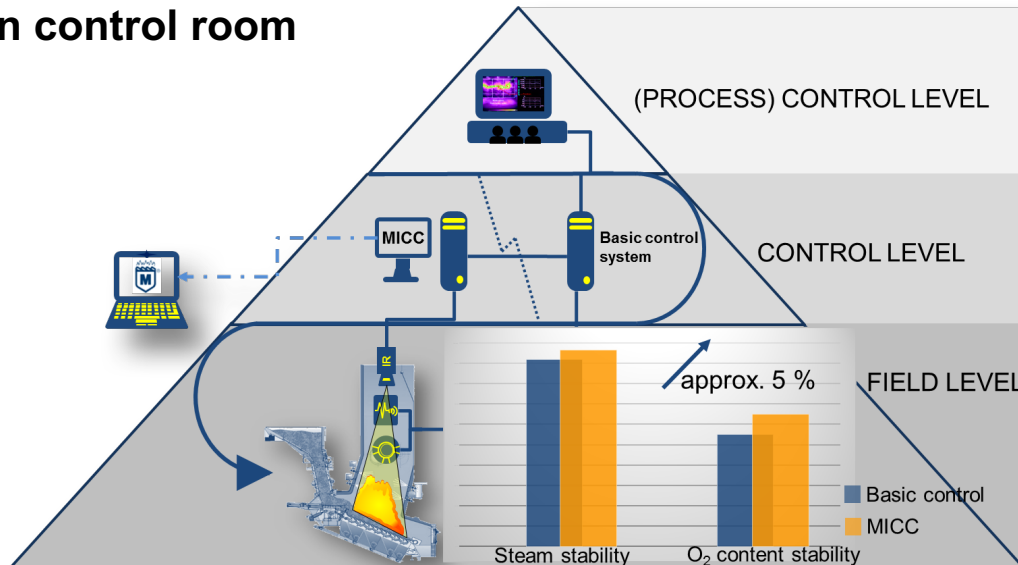
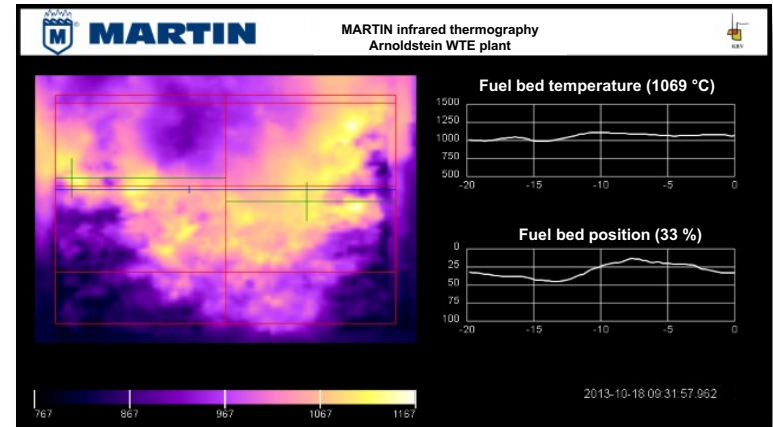
- All concepts based on proven MARTIN technology
- No changes to MARTIN grate necessary
- Focus on fuel residence time / agitation on the grate
- Stable stoichiometric / substoichiometric conditions in the furnace
- Low NO_x emissions / staged combustion
- Staged combustion of well mixed SynGas (GCV of 2 MJ/m³)
- Stable bottom ash quality / burn out for all concepts



Combustion control concepts

MARTIN Infrared Combustion Control MICC

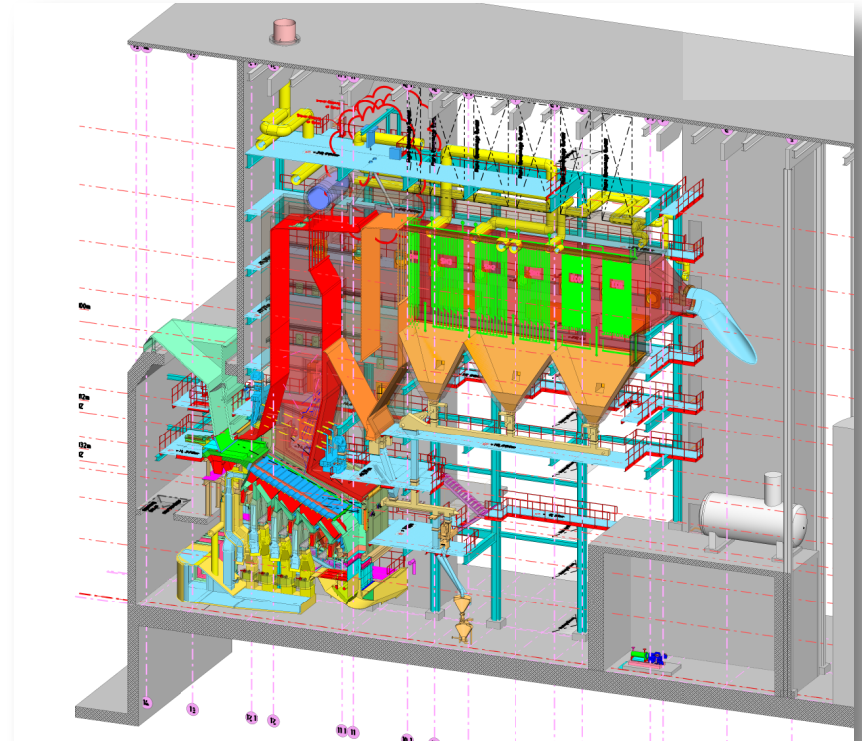
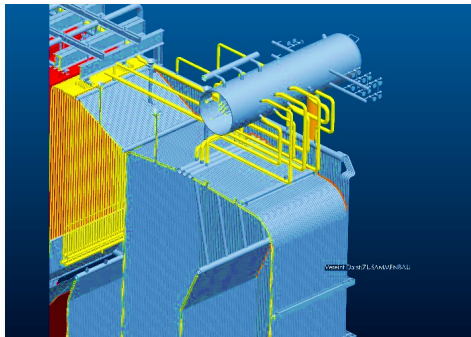
- Fuzzy control with integrated IR camera
- Fuzzy control + IR image evaluation developed by MARTIN
- Optimal operating behavior
- Optimal combustion system efficiency
- Capacity-increase possibilities
- User-friendly system
- High degree of automation / visualization in control room



Boiler concepts

Design

- Heating surfaces of the radiant passes / convective surfaces
- Arrangement of the heating surfaces in the convective pass
- Fouling behavior of the heating surfaces in operation
- Tube material / tube-wall thicknesses / pitch
- Steam flows / temperatures / speeds
- Flue gas flows / temperatures / speeds
- Enhanced cleaning systems
- Refractory lining / Enhanced Inconel cladding in 1st / 2nd pass

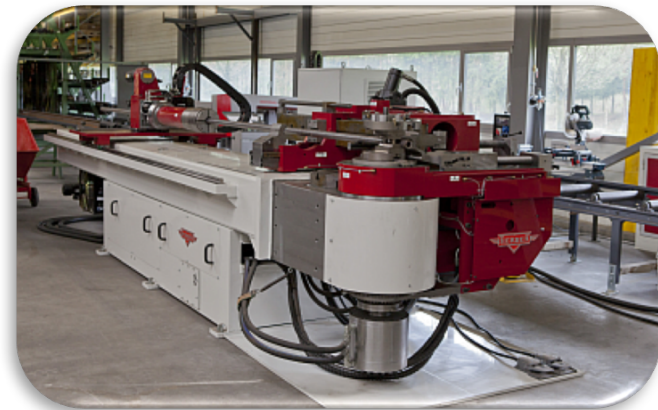


Boiler concepts

Manufacturing

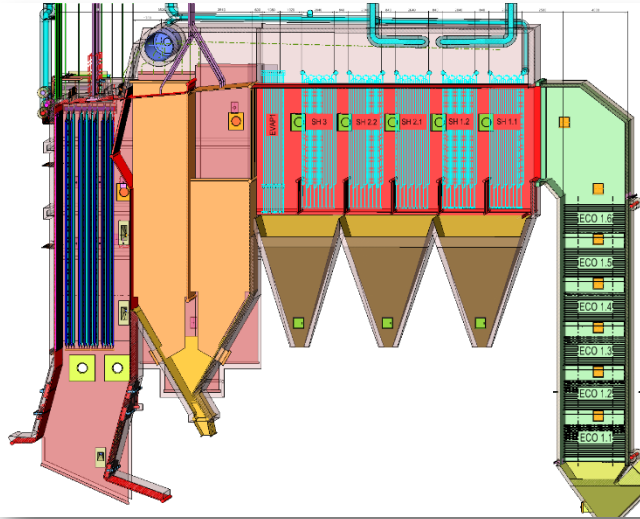


- Welding robots
- Tube-welding machines for coating individual tubes (welding rod + software developed by MARTIN)
- Pipe-bending machines
- Waterjet cutters
- Hydraulic presses
- Blasting machines



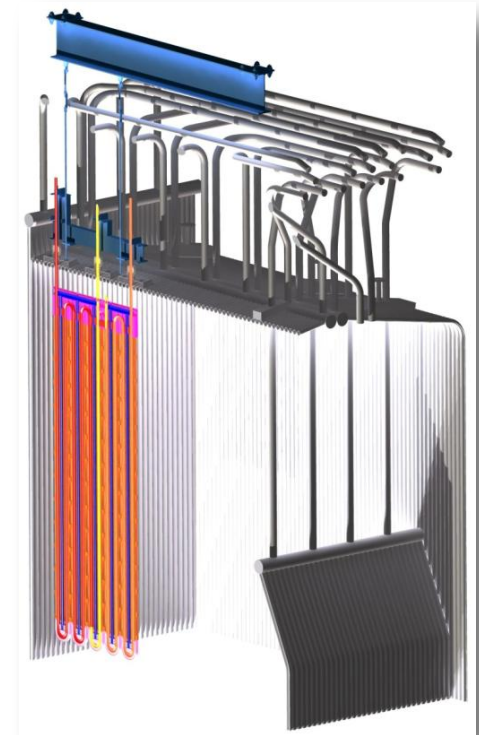
Boiler concepts

Wall superheater / Radiant superheater



- "Protective effect" of the rear-ventilated tiles used for heating from both sides (patent pending)
- Installed in boiler roof
- Heated by flame radiation

- Membrane walls protected by rear-ventilated tile systems
- Sealing air between the membrane wall and tile creates a corrosion-free atmosphere
- Excellent protection of the membrane wall
- Service periods of up to 10 years

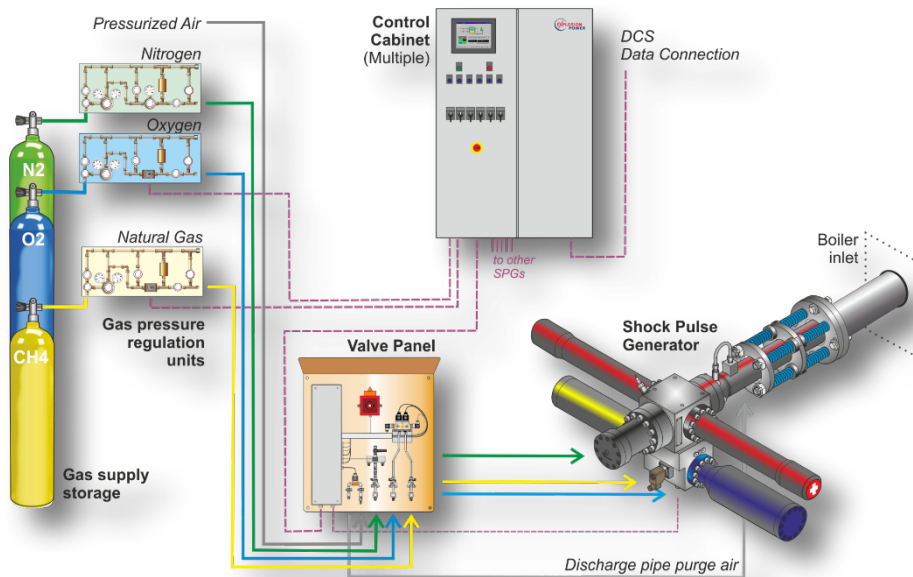


Online cleaning concepts

Shock Pulse Generators

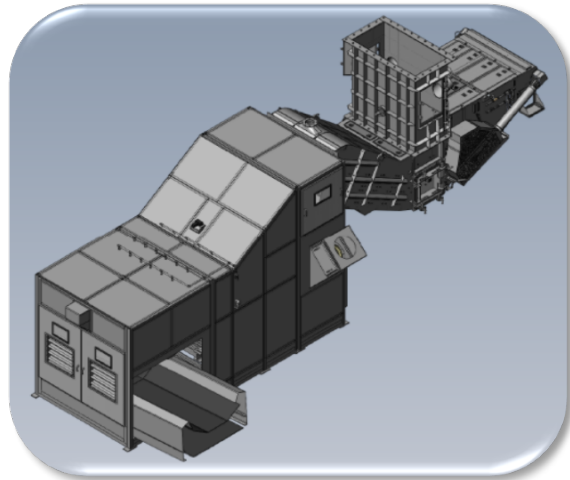


- Improved cleaning efficiency compared to conventional cleaning technologies
- Higher boiler efficiency due to lower exhaust temperature
- Higher plant availability due to longer boiler service period
- No thermal abrasion or damaging of boiler pipes
- Reduced operating cost / no steam consumption
- Reduced maintenance costs / less cleaning required during maintenance stops



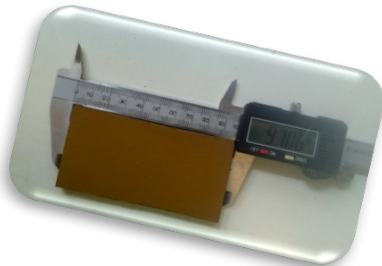
Resource recovery concepts

Dry bottom ash discharge / processing



MARTIN air separator

- Separation of fine + coarse fraction
- Extraction of dust + fibers
- Virtually dust-free downstream processes
- Suitable for wet discharge

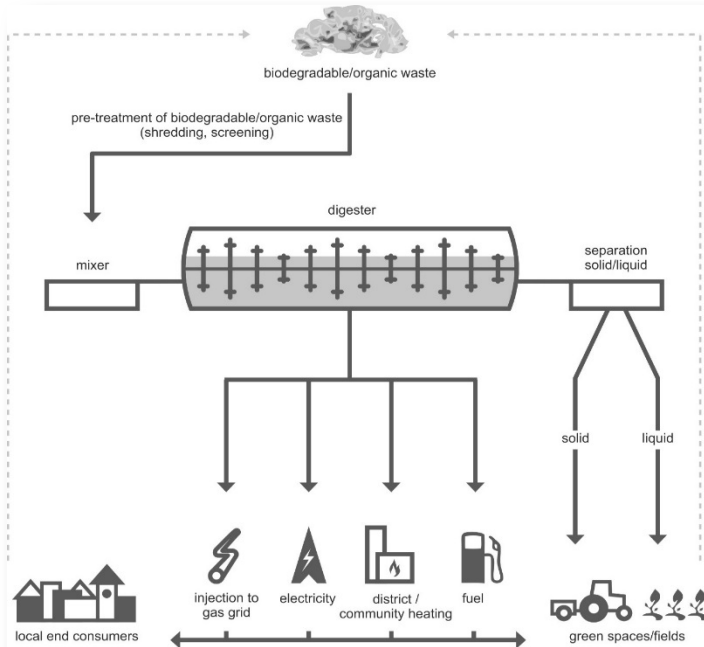
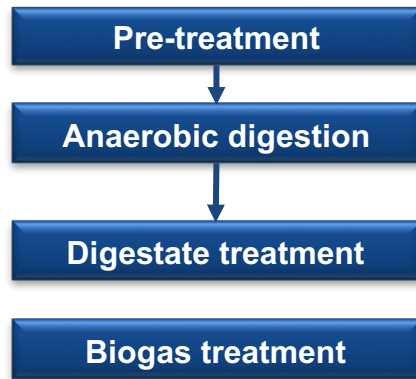


MARTIN dry bottom ash processing

- Qualitatively high-grade recovery of
 - Metals (Fe + NF + INOX)
 - Glass
 - Minerals

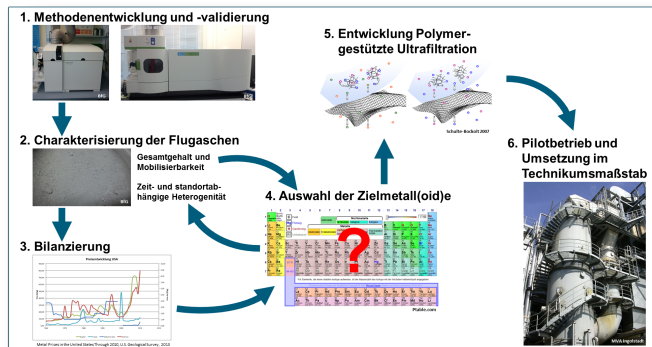
Organic waste concepts

MARTIN anaerobic digestion (Thöni system)



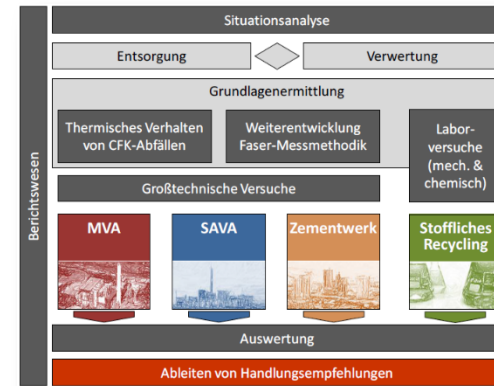
Recovery of secondary materials from fly ashes

BMBF FKZ 033R140A



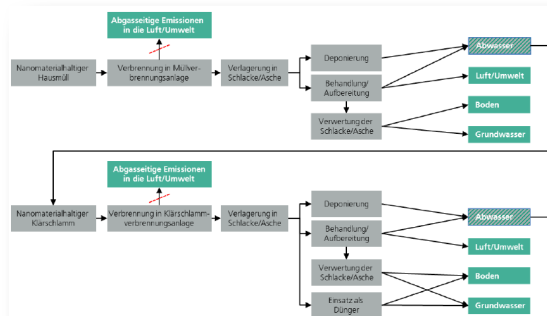
Thermal processing of carbon fiber waste

UFOPLAN FKZ 3716343180

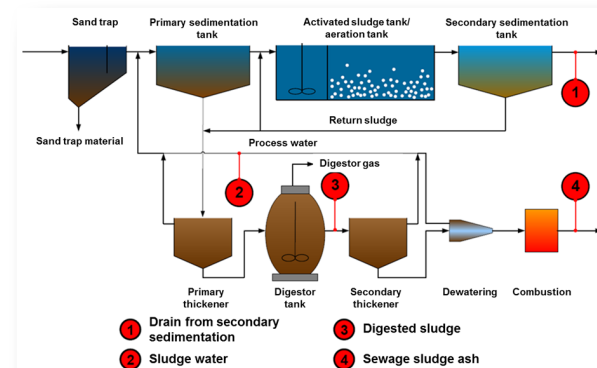


Possible release of nanoparticles from disposal of mineral waste

UFOPLAN FKZ 3716343190



Recovery of phosphorus



Conclusions

Future prospects

- Progress from combustion plant to modern production / recycling facility
- MARTIN grate technologies are flexible for all kinds of waste
- MARTIN reverse-acting grate system can be combined with conversion technologies
- Modern WtE plants + optimized technology concepts are responsible for highly efficient energy / resource recovery
- Corrosion-protected wall / radiant superheaters significantly improve energy efficiency
- Steam parameters >> 400 °C / 40 bar
- Combustion with low raw NO_x values and low O₂
- Continuous operating time of plant > 8,000 h / plant availability > 90 %
- WtE residues have great potential in terms of resources
- MARTIN technologies are successful worldwide www.martingmbh.de
- MARTIN will continue to reliably ensure thermal treatment of waste using the most advanced innovations + guarantee proven process engineering technology

Many thanks for your kind attention



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