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# Tech Solutions

## Low-Energy Electron Beam

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# Bühler at a glance.

Global market leader with a strong presence in local markets.



**CHF 3.3 billion**

Turnover



**140**

Countries



**98**

Service stations



**32**

Manufacturing sites



**12,767**

Employees



**100%**

Family-owned company



**Up to 5%**

of turnover are invested in  
Research & Development



**50%**

reduction of energy, waste, and  
water in our customers' value  
chains by 2025.

# Every day, billions of people come into contact with Bühler.



06:30

07:15

10:00

15:00

19:00



07:00

07:30

12:00

18:00

20:00



## Food safety challenge

Low-moisture foods as carriers of harmful microorganisms.



**1 in 10 people**  
fall ill after eating  
contaminated  
food.

**1/3 of food is**  
wasted.  
1.3 billion tons per  
year!

**Costly recalls.**  
Average cost in the  
US: \$10 million



Existing microbial reduction solutions for dry foods have limitations.



### Steam

- Alteration of food quality
- High energy demand
- High investment costs



### Chemicals

- Risks for the environment and workers
- Carcinogenic effects of residues
- Banned in several countries



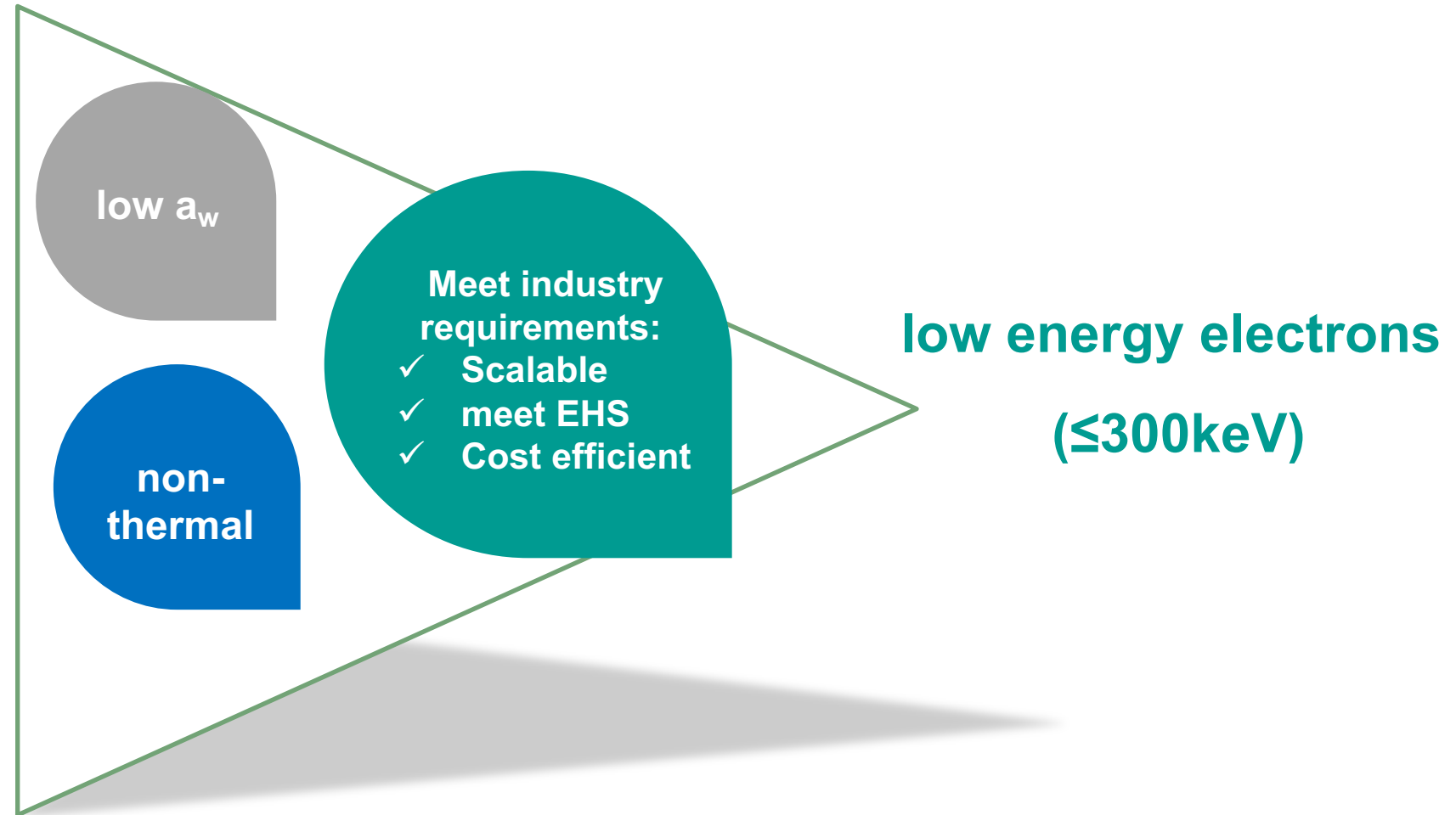
### Radioactive sources

- Logistics and transport costs
- Alteration of food quality (fat-rich foods)
- Risks for the environment



# Screening study.

steam	✓	
hot air	✓	
ohmic heating	✓	
microwave	✓	
infrared	✓	
radiofrequency		
high pressure	✓	
shockwaves	✓	
ultrasound	✓	
pulsed electric fields	✓	
electrolysed water	✓	
ozone	✓	✓
electron beam	✓	✓
cold plasma	✓	✓
ultraviolet	✓	✓
pulsed light	✓	✓
critical CO <sub>2</sub>	✓	✓
chemicals & gases	✓	✓



# Low-energy electrons - Success in filling machines.



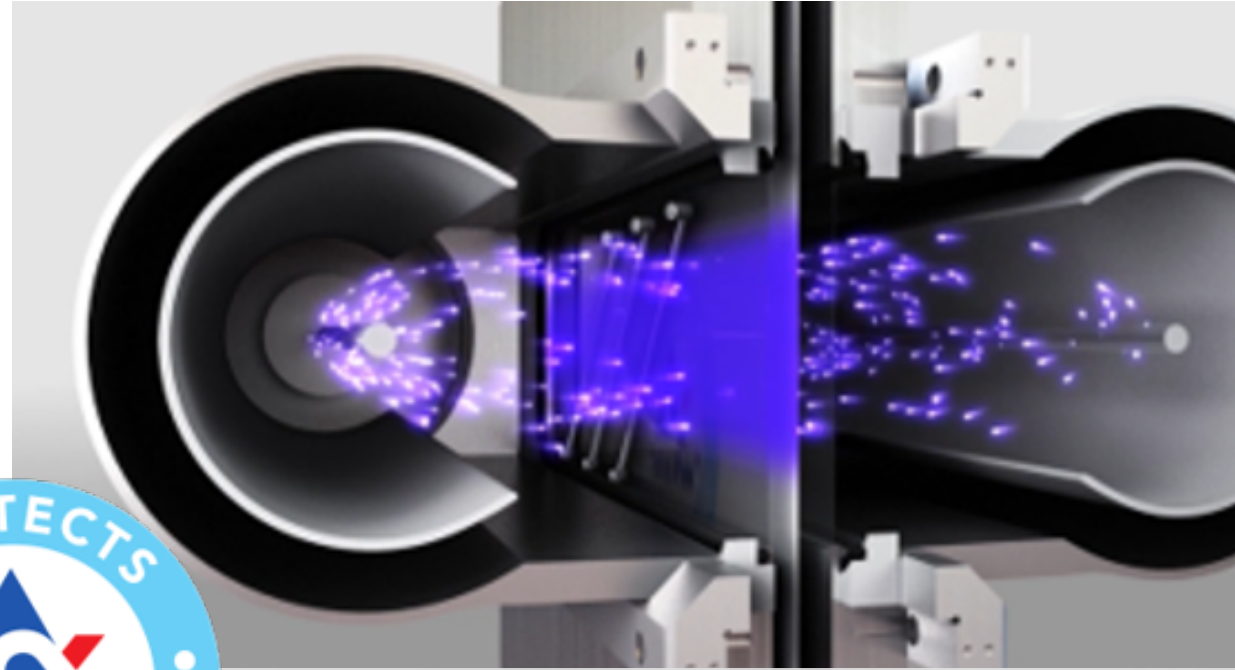
Increased production flexibility



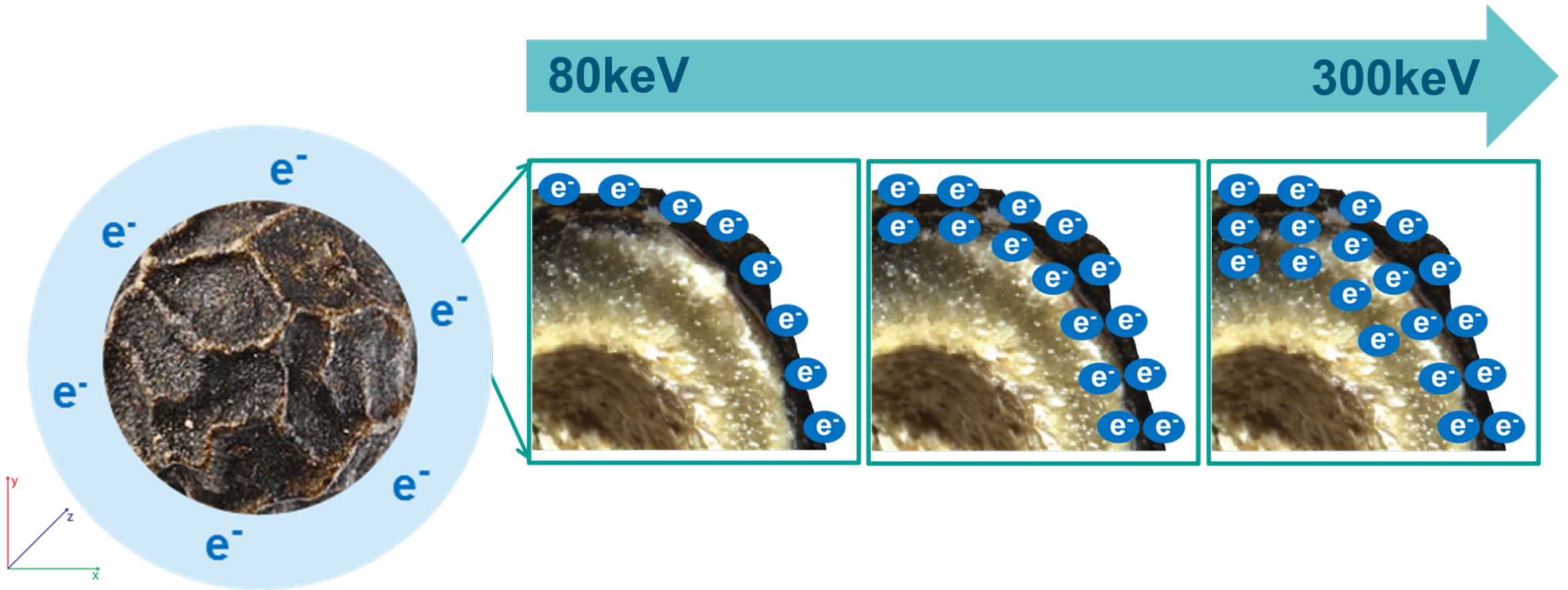
Better environmental performance



Reduced operational costs



# Harnessing low-energy electrons.





# Surface and volumetric treatment - LEEB vs HEEB.



Untreated

Low-energy electron  
beam treated  
( $<300\text{ keV}$ )

High-energy  
electron beam  
treated (10 MeV)



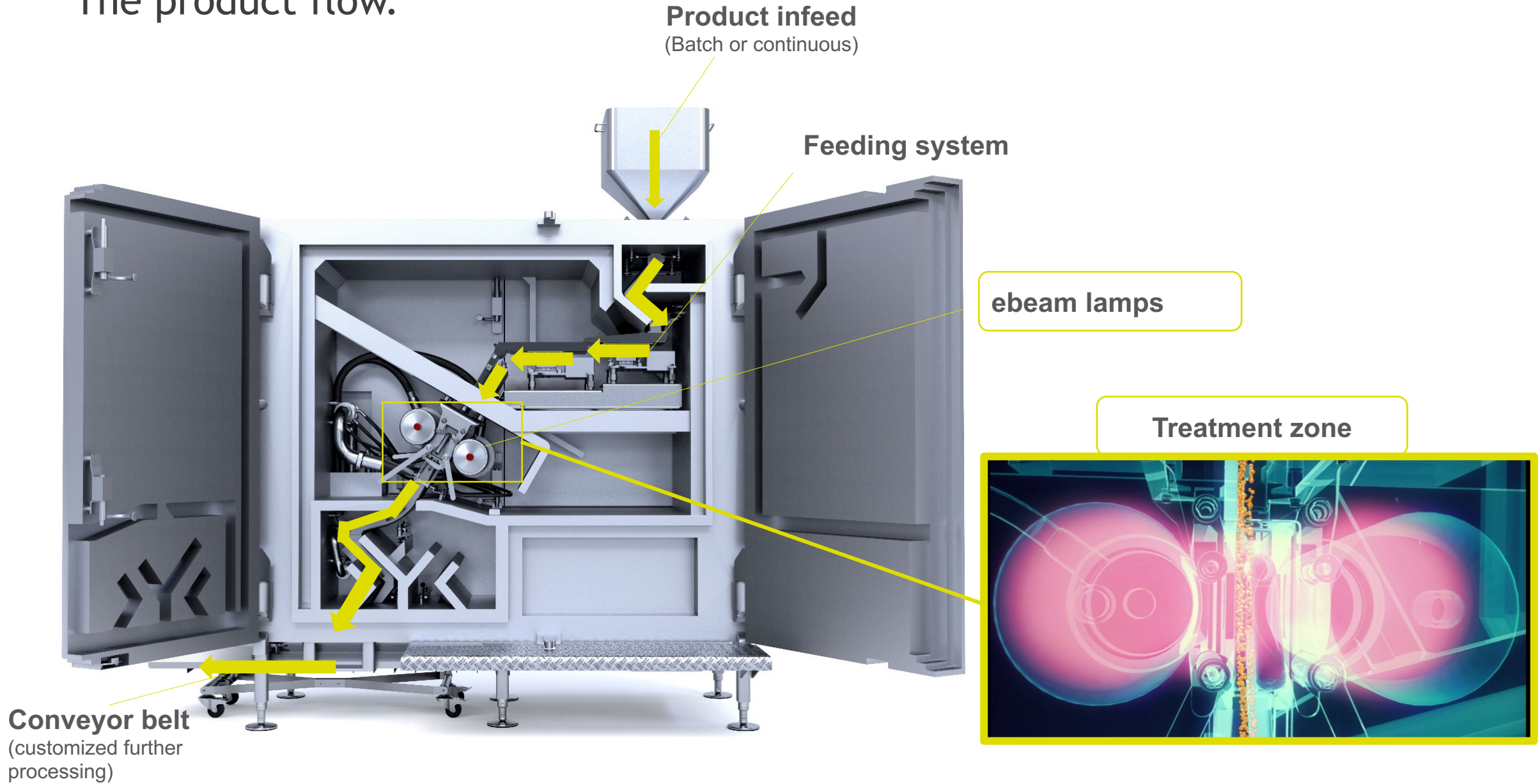
# Laatu

Innovative food safety solution.





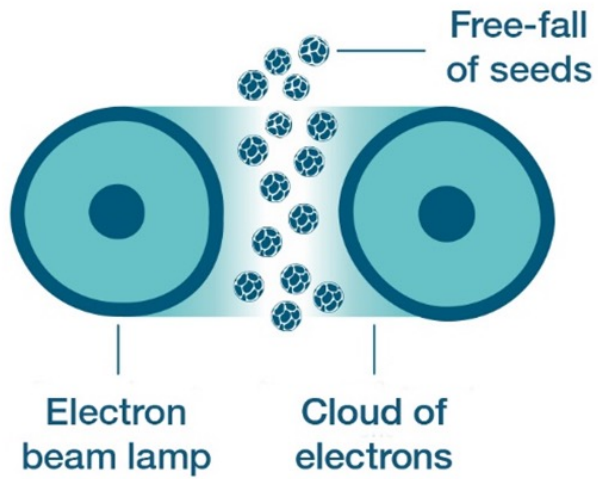
# The product flow.



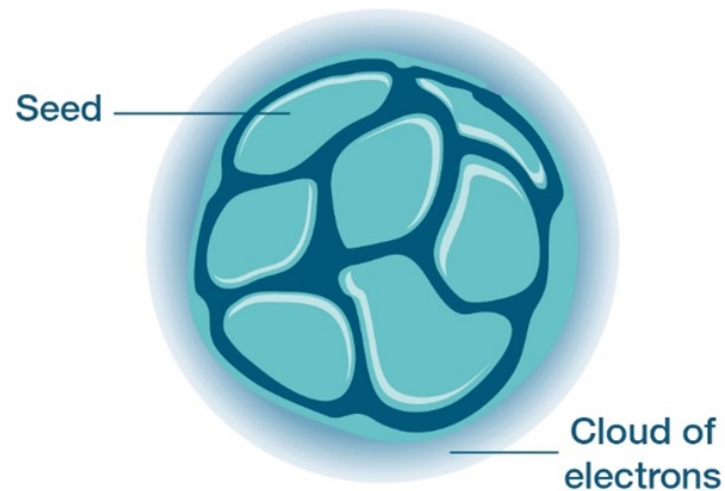


Gentle but effective.

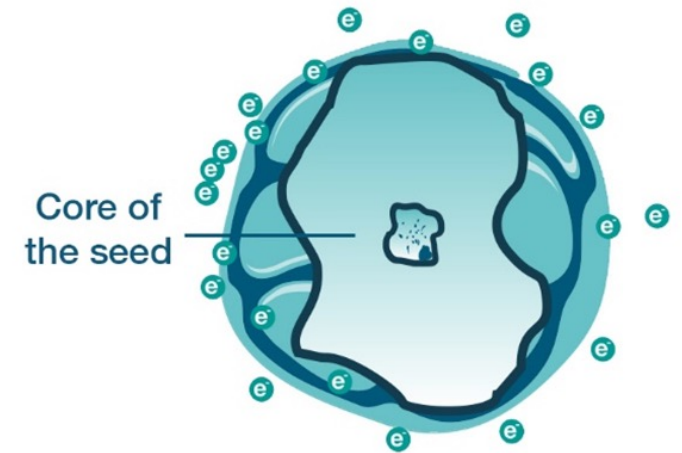
### Microbial reduction in milliseconds



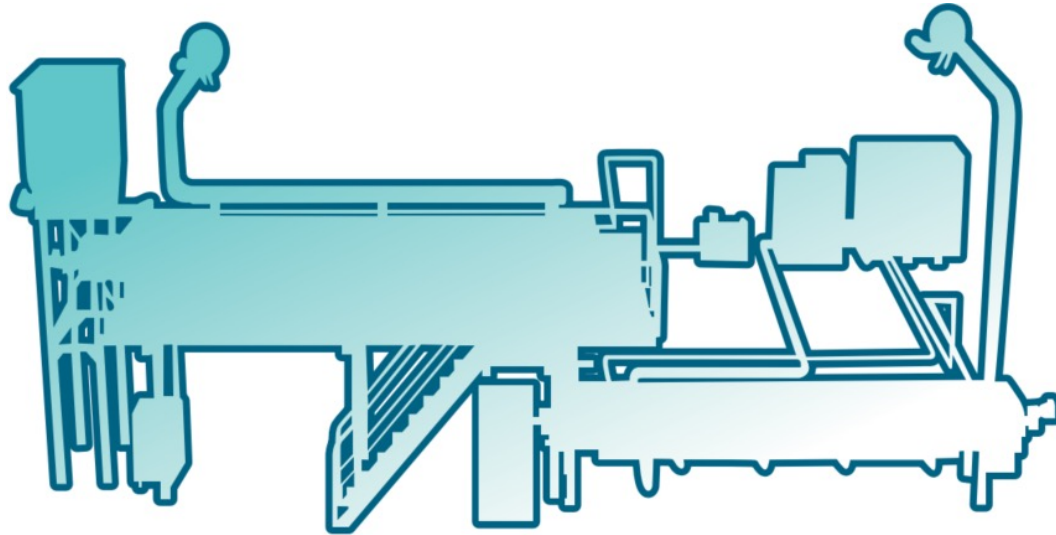
### Treatment of the surface



### Minimal or no impact to internal structure



Significantly smaller footprint.



Steam equipment



Chemical equipment



Laatu

**SIZE MATTERS!**

# Laatu

A new food safety application which benefits all stakeholders.



- Control your process and price
- Unmatched product quality
- Data at your fingertips
- Environmentally sustainable solution

Why?

- Small footprint and self-shielded
- Validated microbial kill-step
- Easy to operate
- Increase flexibility and availability

How?

- No CAPEX, competitive OPEX
- Simplify value chain and reduce cost
- Customer focus and satisfaction
- Entrepreneurial freedom

What?



IFIS 2021

# Thanks.

 [Laatu](#)

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