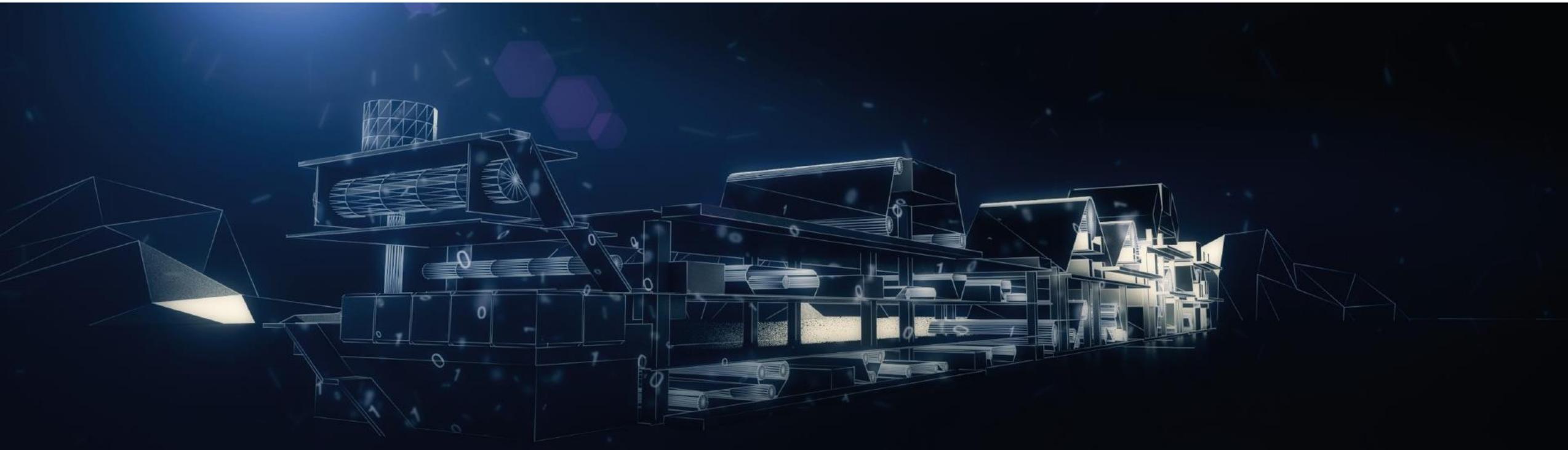


Low Carbon Paper Production

EU ETS Innovation Fund Implementation

Timo Kalefe | 2019-06-18 | public



Low Carbon Papermaking

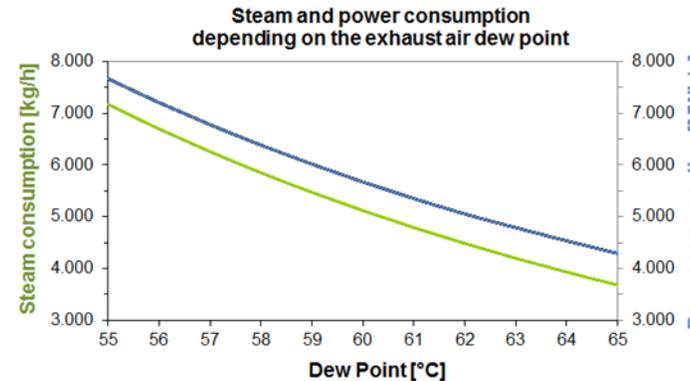
Focus areas



Advanced Process Efficiency

VOITH

Decreased CO₂ emissions by High Dew Point Hood (65°C)



CO₂ / Energy Savings*

> **25%** (from 62°C to 65°C)
> **40%** (from 55°C to 65°C)

Other Benefits

Production increase with same air system

TRL

New product with first references

Investments

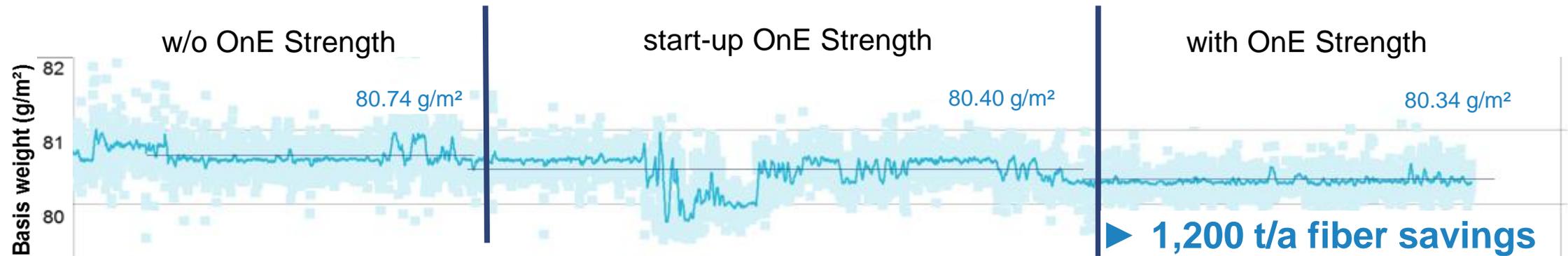
500 – 1800 T€

Key Challenges

- ▶ Shutdown time for dismantling & installation 12-15 days: needs to fit in production schedule / profit loss
- ▶ Acceptance of operators: Higher humidity in hood results in more harsh inside condition

Advanced Process Control (APC)

OnEfficiency: significant fiber and energy savings



 <p>CO₂ / Energy Savings* Current: 1 - 2% Future: 5 - 10%</p>	 <p>Other Benefits Fiber & cost savings</p>	 <p>TRL APC portfolio with first solutions</p>	 <p>Investments 350,000 - 1 Mio €</p>
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Key Challenges

- ▶ Acceptance for digital solutions
- ▶ Additional efforts are required for the adoption to different processes

New Process Technologies

New pulping concept to decrease energy consumption



CO₂ / Energy Savings*

10 - 20%

Other Benefits

Recycling of multi-component materials

TRL

Market Test

Investments

2 - 6 Mio €

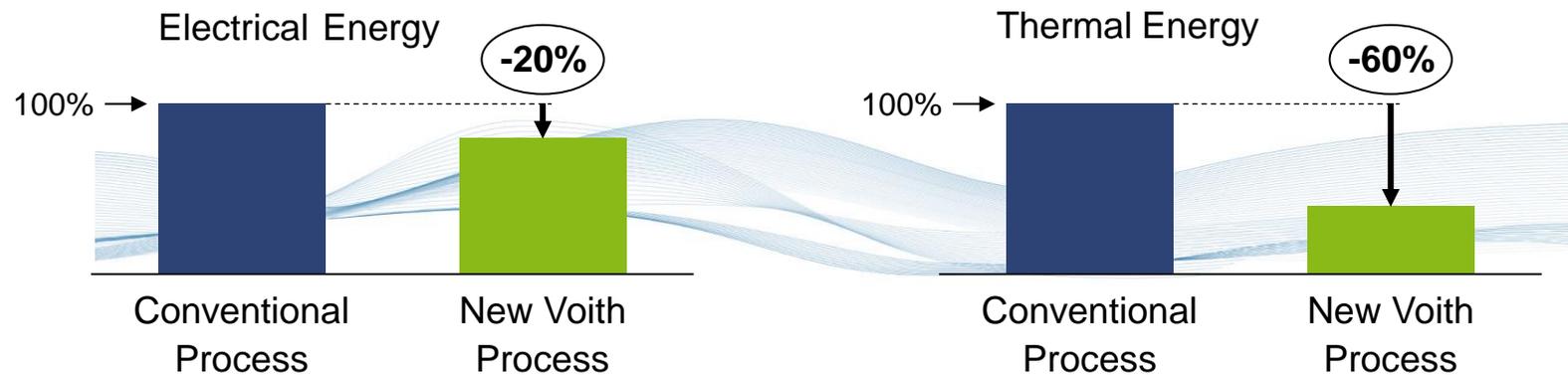
Key Challenges

- ▶ New process technologies have to compete with existing optimized and cost efficient processes
- ▶ Technical and technological challenges in continuous operation not fully known yet

Breakthrough Papermaking Technologies

VOITH

New process concept for lowest possible GHG emissions



 CO₂ / Energy Savings* > 50%	 Other Benefits Differentiation, low complexity	 TRL Feasibility, Development	 Investments > 25 Mio. €
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Key Challenges

- ▶ High CAPEX investments
- ▶ High efforts for development with uncertainties

Pathways to decarbonize the paper industry

Current and future potential of different action fields



Contact:

Timo Kalefe

Innovation Manager

Phone +49 07321 37 6841

Timo.Kalefe@voith.com

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