

ANDRITZ CAPITAL MARKET DAY 2021

PULP & PAPER CAPITAL

JOACHIM SCHÖNBECK

SEPTEMBER 15, 2021

ANDRITZ
ENGINEERED SUCCESS

REVIEW CMD 2019: ROADMAP 2020-2022

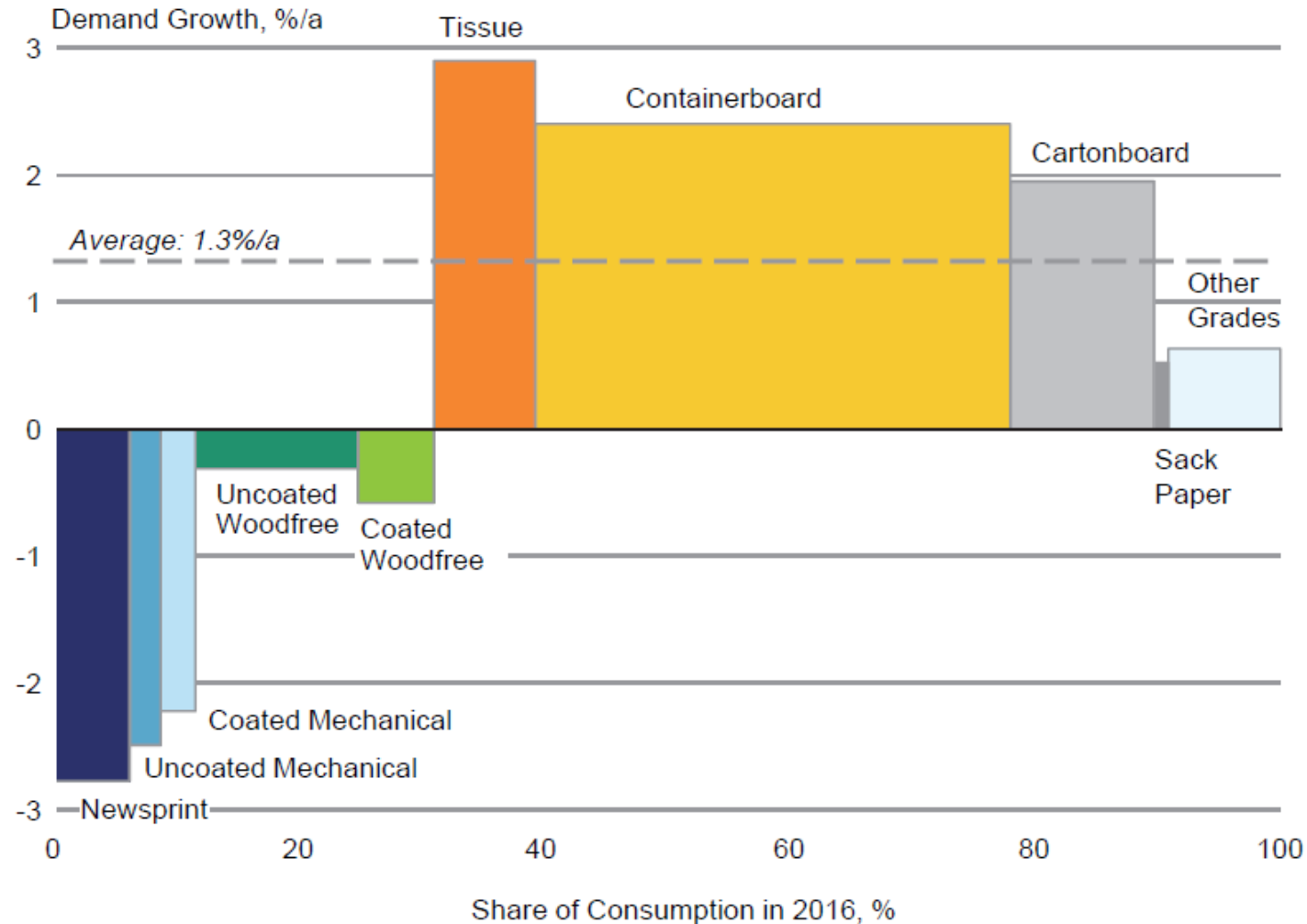


TARGET	STATUS	
<ul style="list-style-type: none">• Target to make it a 3 billion+ EUR business	P&P revenue 2020: 3.3 billion EUR	 Achieved
<ul style="list-style-type: none">• Further good growth potential seen in the power market	Business volume increased by 70% from 2018 to 2020	 Achieved
<ul style="list-style-type: none">• Goal is to maintain high profitability in future → This should be supported by the strong technical market position in pulp and the further expansion of the service business	<u>P&P EBITA</u> YTD-12 2019: 9.4% YTD-12 2020: 9.7% YTD-6 2021: 10.4%	 Achieved
<ul style="list-style-type: none">• Improve earnings in Paper Technology	Work in progress	 Ongoing

ECONOMICAL DRIVERS (1)



Long-term demand growth by product area 2016-2030

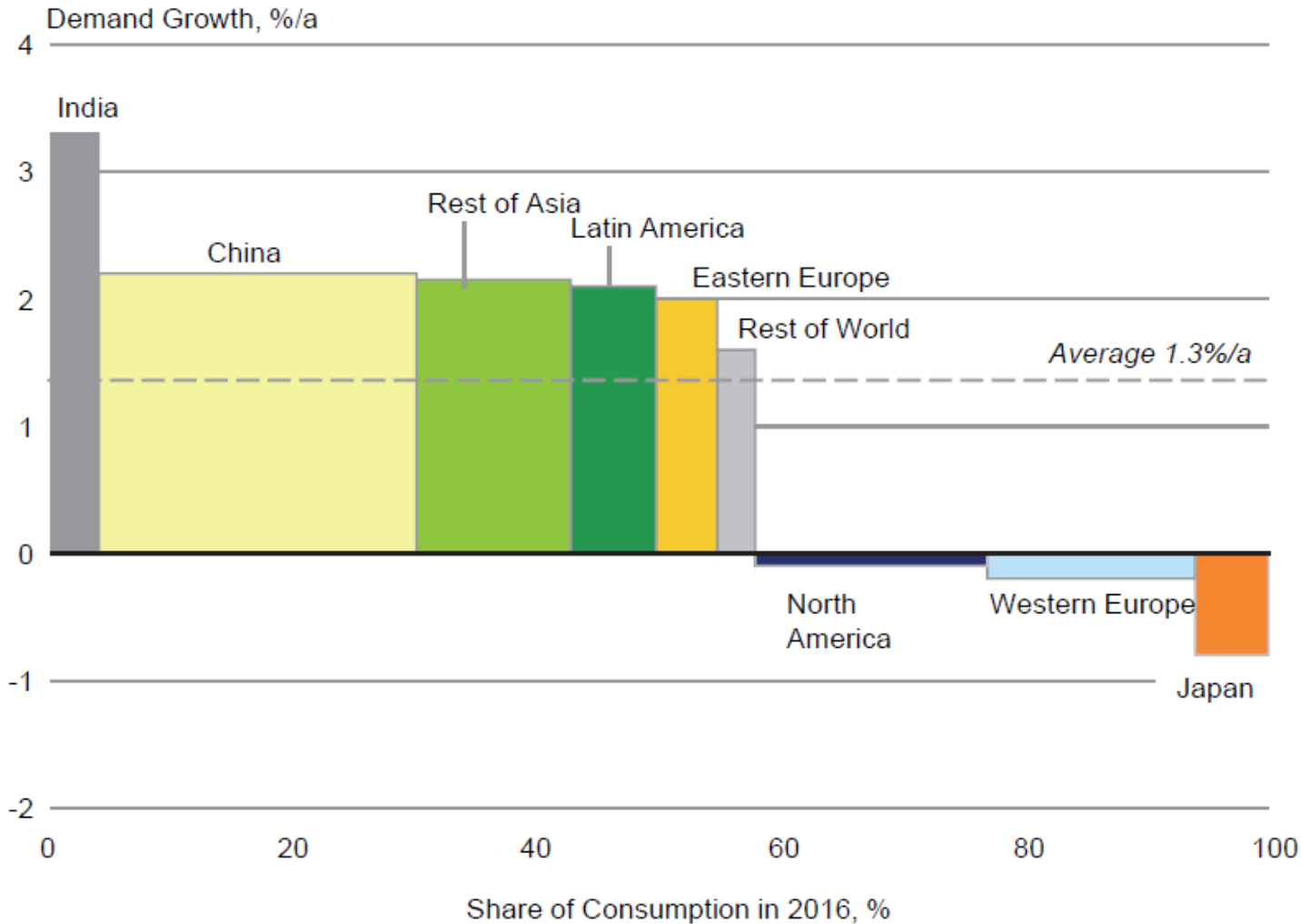


Source: Pöyry World Paper Markets up to 2030 (2017)

ECONOMICAL DRIVERS (2)



Long-term demand growth by region 2016-2030



Source: Pöyry World Paper Markets up to 2030 (2017)

ANDRITZ MAINTAINS ITS LEADING POSITION FOR HIGH-CAPACITY FIBERLINES



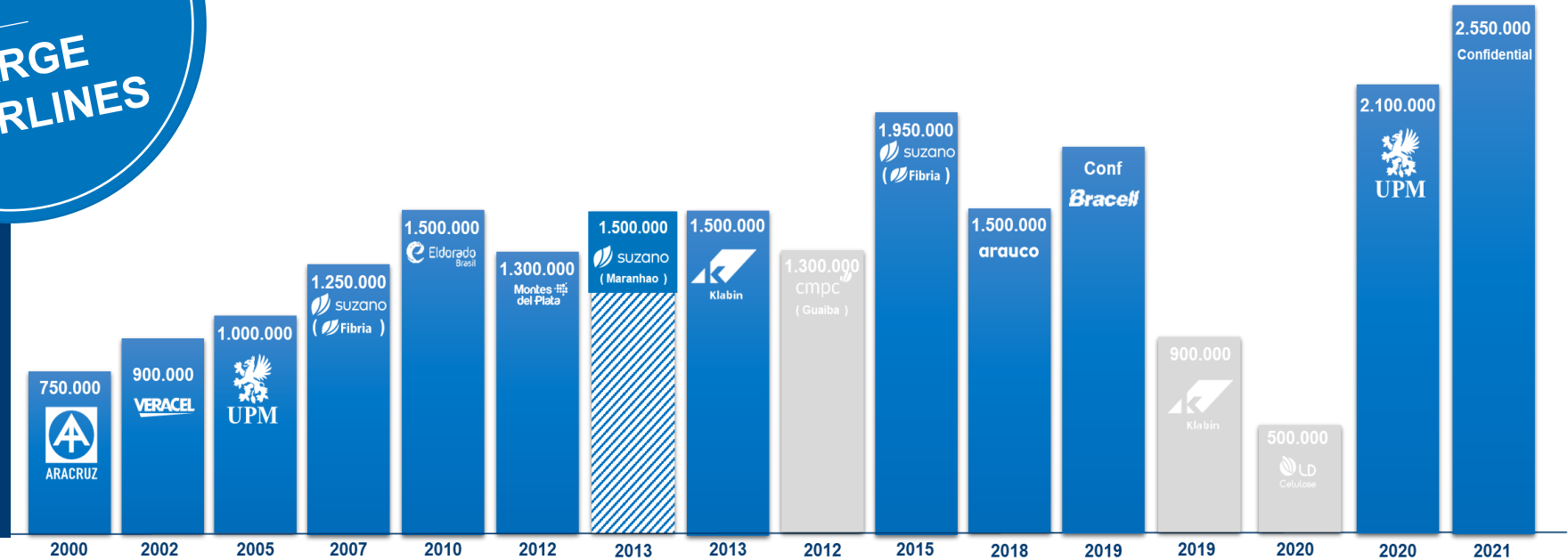
Pulp mill projects in South America

ENGINEERED
SUCCESS

LARGE
FIBERLINES

The Largest
Capacities with
Best Quality

Major Supplier of Big
Fiberlines



MASTERING PROJECT MANAGEMENT IS PARAMOUNT TO ENSURE PROFITABILITY



EPC delivery of a complete pulp mill for Suzano Horizonte 2, Tres Lagoas, Brazil

<ul style="list-style-type: none">• Total delivery 118,410 tons• Local 93,780 tons• Import 24,630 tons		<ul style="list-style-type: none">• ANDRITZ PM Team 1,000 FTE		
<ul style="list-style-type: none">• Oversize transports 404• Local 183• Import 221			<ul style="list-style-type: none">• Total hours at site 15 mill.• Lost time accidents 8• AFR 0.6	

ANDRITZ IS LEADER IN QUICK START-UPS OF PULP MILLS

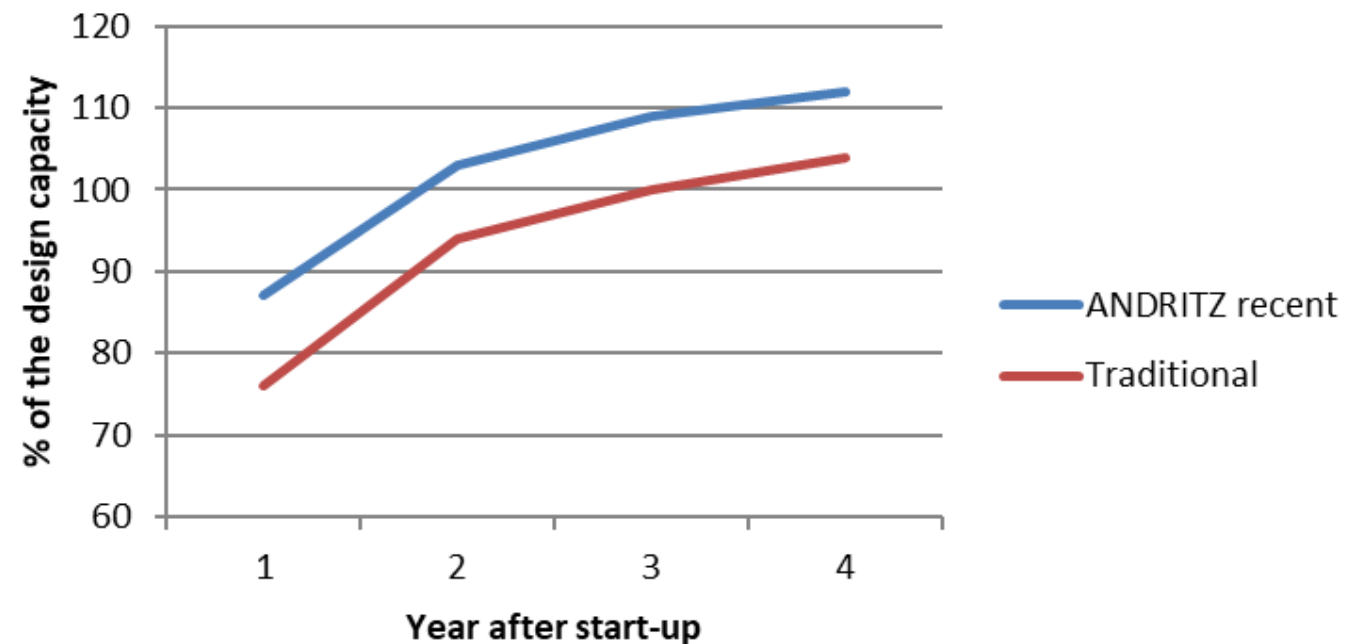


Pulp mills supplied by ANDRITZ reached 10% higher production on average (vs. design) compared to other recently built mills

Reasons for high performance:

- Optimized processes
- Reliable equipment/high availability
- High level of IIoT solutions
- Strive towards autonomous operations
- Operation performance improvement projects (Metris OPP)
- Maintenance contracts with ANDRITZ

Start-up curves of recent pulp mills (annual averages)



Source: Press releases, Production reports, Annual reports; RISI

ANDRITZ PROVIDES LEADING SOLUTIONS FOR THE CURRENT MEGATRENDS



Decarbonization



- Renewable Energy
- E-Mobility
- Biofuels
- ...

Circular Economy



- Recycling
- Textile Recycling
- CircleToZero
- A-Recovery+
- ...

Digitalization



- Asset Performance Management
- Autonomous Operation
- Industrial Cyber Security

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Decarbonization



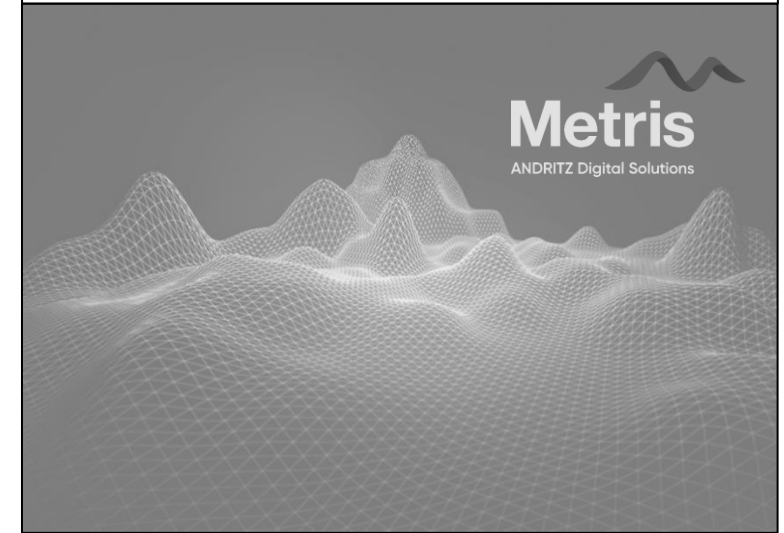
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- Biofuels
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Circular Economy



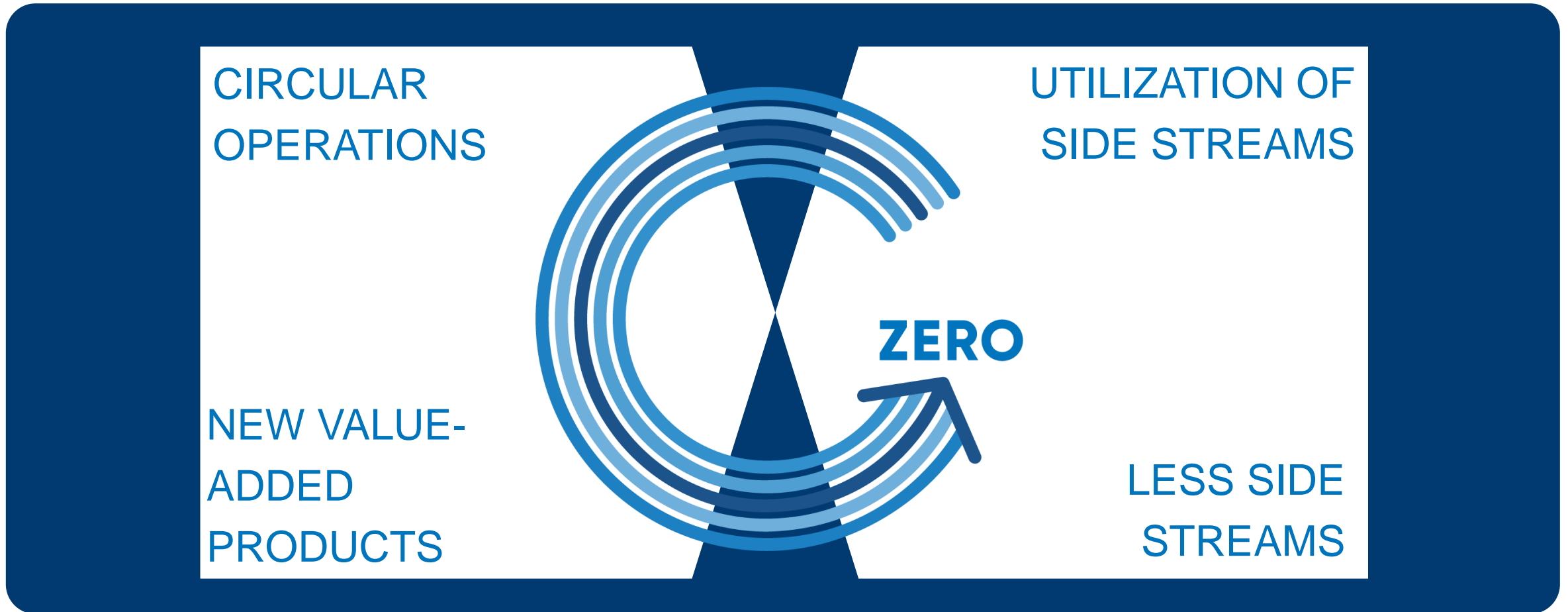
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CircleToZero™ IS A SHARED JOURNEY



CircleToZero™ PROGRAMM OVERVIEW



Zero Waste & Zero Emission pulp mill

Goal

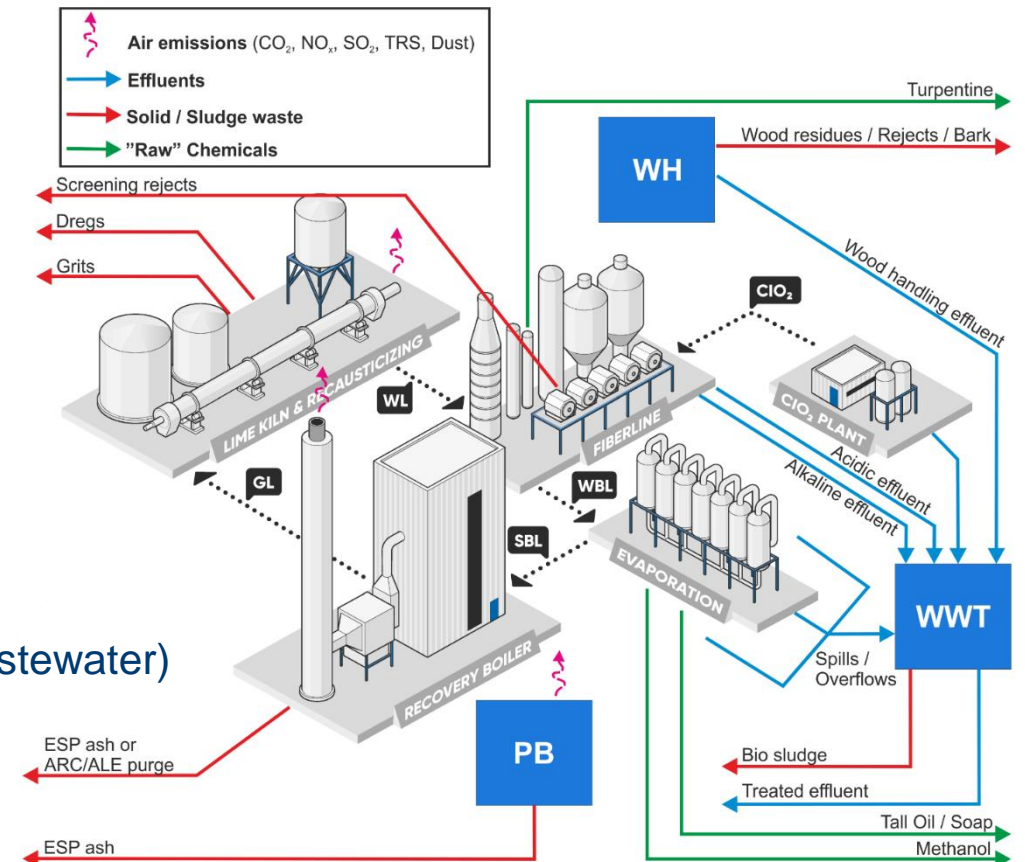
Production of pulp

- without any waste or emissions
- by reusing the chemicals and
- by turning all the side streams into value added products

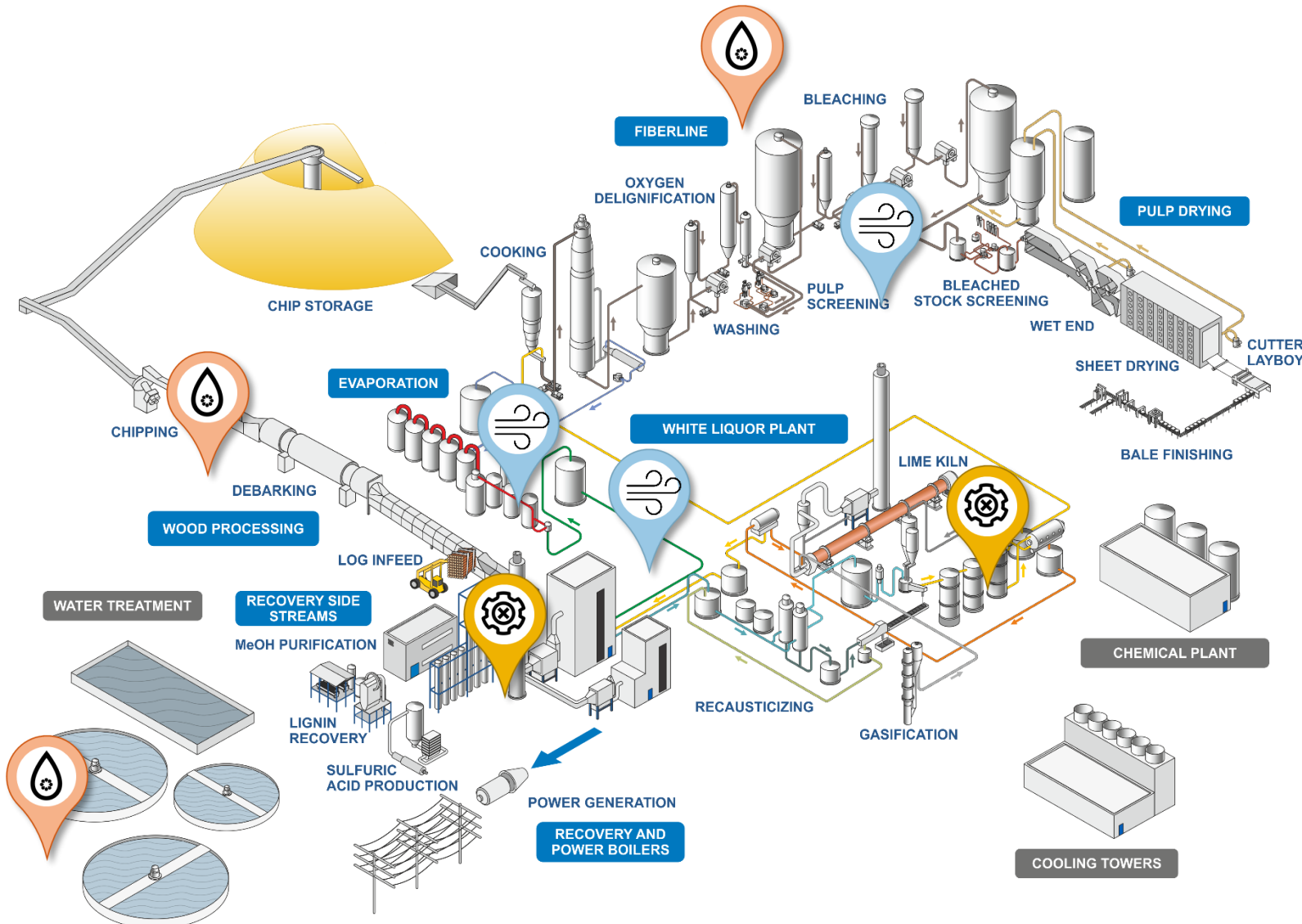
Strategy

Develop technologies

- to utilize existing side streams (emissions, solid waste, wastewater)
- and remove or recycle non-process elements (NPEs)



CircleToZero™ DOES NOT START FROM SCRATCH



Production of Biomethanol
• First plant in operation

Production of sulphuric acid
• First plant under construction

 AIR EMISSIONS

 SOLID WASTE

 EFFLUENTS

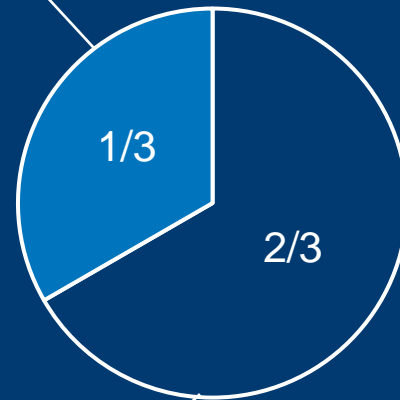
PULP INDUSTRY OFFERS A POTENTIAL OF 1 MILLION TONS OF HIGH QUALITY BIOMETHANOL



CURRENT METHANOL DEMAND

98,000,000 TONS

Fuel applications

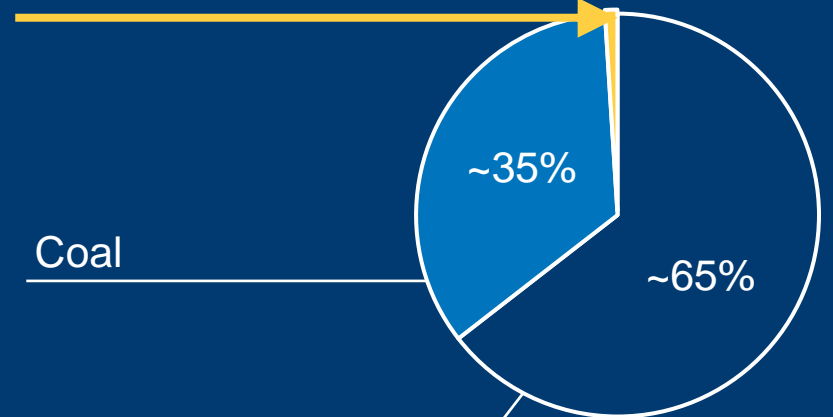


Chemicals and plastics

CURRENT METHANOL SUPPLY

98,000,000 TONS

~1% Renewable Sources



Coal

Natural gas

AIR QUALITY CONTROL SYSTEM BUSINESS FROM GE



- ANDRITZ acquired from the market leader GE the **industrial dedusting** business
 - Electrostatic Precipitators – ESP
 - Switch-Integrated Rectifier (SIR)
 - Fabric Filters (FF).
- Access to an **installed base** of more than **2,000 plants**.
- **Engineering center in Växjö, Sweden** and market experts in relevant regions
- Strong **growth opportunity**



ESP Suzano, Horizonte 2



ESP APP, OKI

Large portfolio with best-in-class emission control technology for wide range of Air Pollution Control applications:

- Pulp & Paper
- Steel and Metals
- Energy
- Cement

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Decarbonization



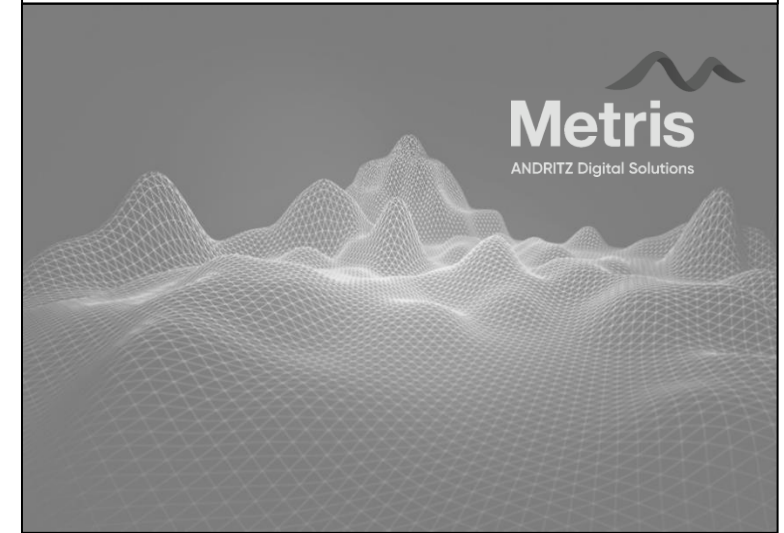
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Circular Economy



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Digitalization



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ANDRITZ LAROCHE – SPECIALIST IN TEXTILE RECYCLING AND NATURAL FIBER PROCESSES



Strategic product fit for ANDRITZ Nonwoven with a complementary product portfolio

- Fiber Opening and Blending for nonwovens
- Textile Recycling
- Natural Fiber Processing

Driver for future growth



Textile Recycling



Natural Fiber Processing

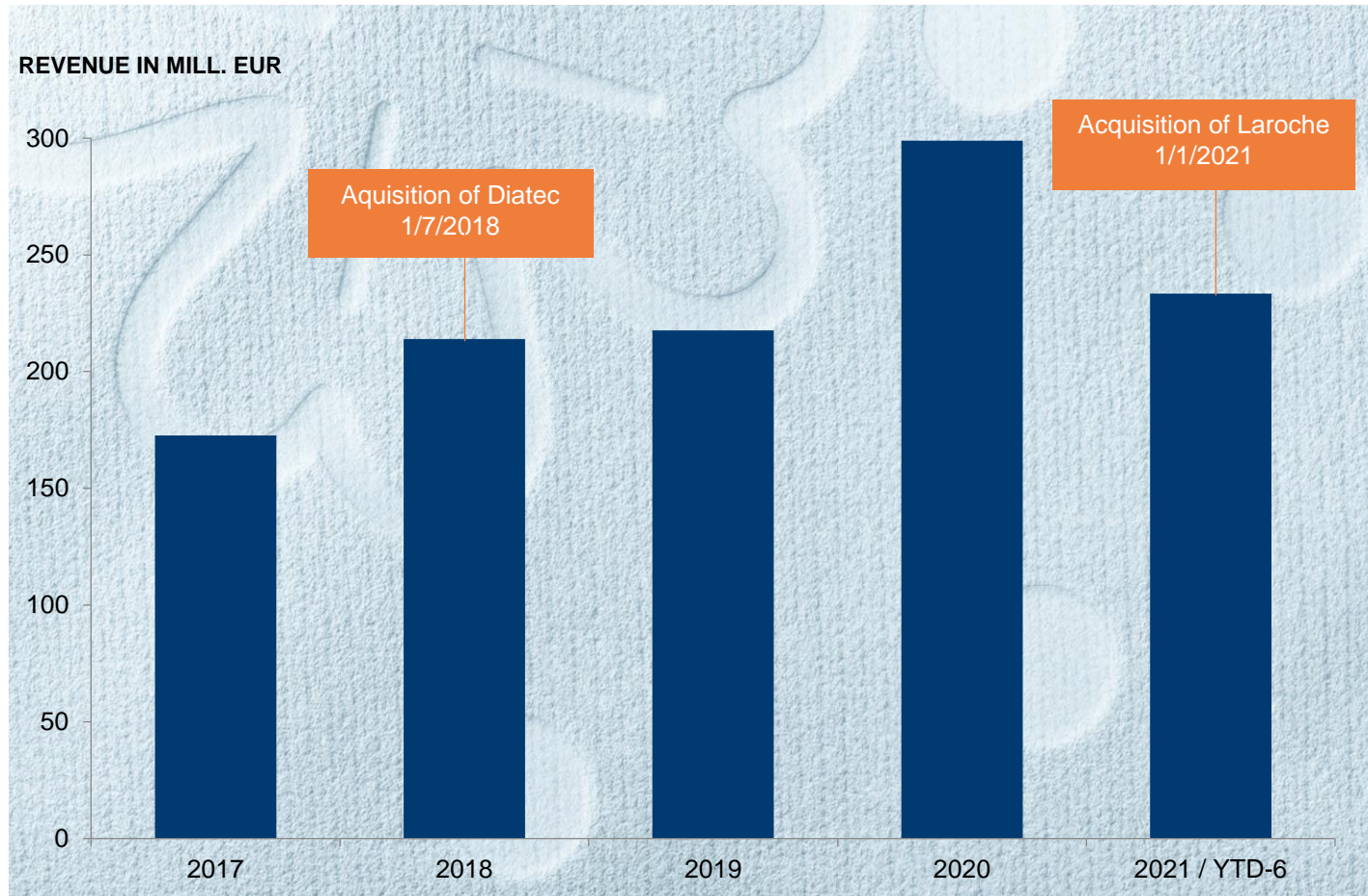


Location: Cours-la-Ville (80 km northwest of Lyon), France

ANDRITZ NONWOVEN – COMPLETE PRODUCTION LINES FOR THE NONWOVENS INDUSTRY

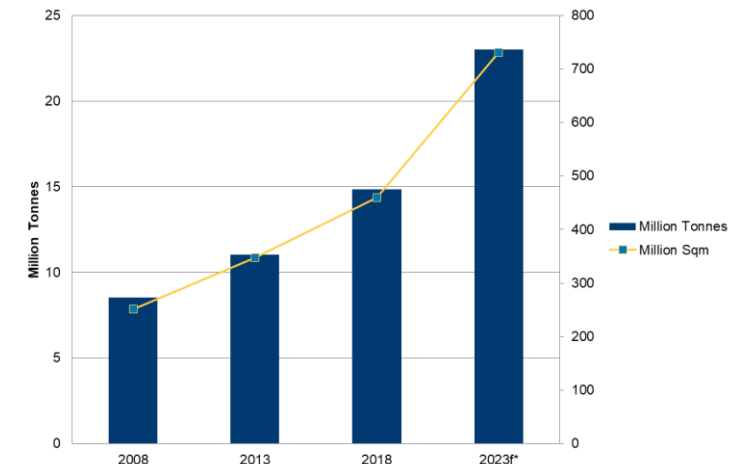


A constantly growing market



HIGH GROWTH DUE TO

- Strong demand for nonwovens in medical and hygiene products, like face masks, surgical gowns and drapes, disinfection wipes, etc.
- Sustainable and cost-efficient production processes for biodegradable wipes
- Increasing demand on Textile recycled fiber applications: “European Green Deal”



Source: INDA-EDANA; ANDRITZ estimate

Note: The significant increase is driven by the impact of Covid-19 crisis and the hygiene end-uses.

PANDEMIC'S OPPORTUNITY: FACE MASK MACHINE

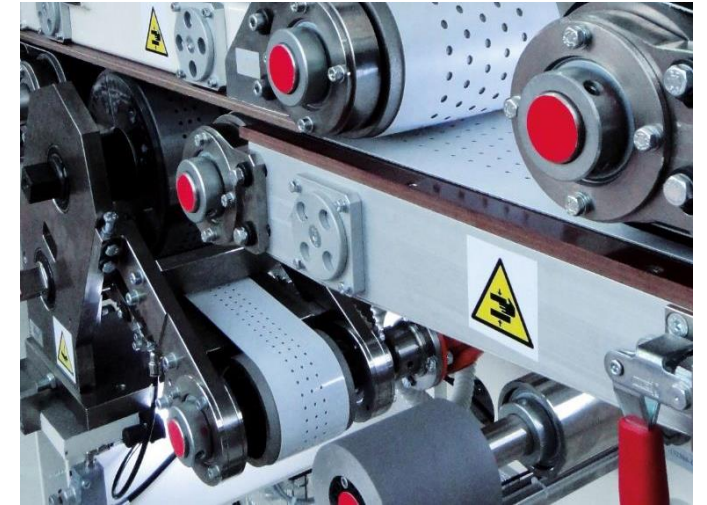


Head start development in record time in April/May 2020

- Machine and process design within 6 weeks
- > 100 project requests from the market within 3 weeks
- **> 30 Face Mask Machines already in production**
- Fully automated (one operator only)

Machine Specification

- Pieces per minute: up to 600
- **Pieces per day: up to 750,000**
- Efficiency rate: 90%
- Production speed: 110 m/min
- Line length: 1,4000 mm
- Line width: 2,000 mm
- Line height: 2,500 mm



TEXTILE FIBER



Replacement of plastic and cotton fibers offer huge business opportunities for ANDRITZ

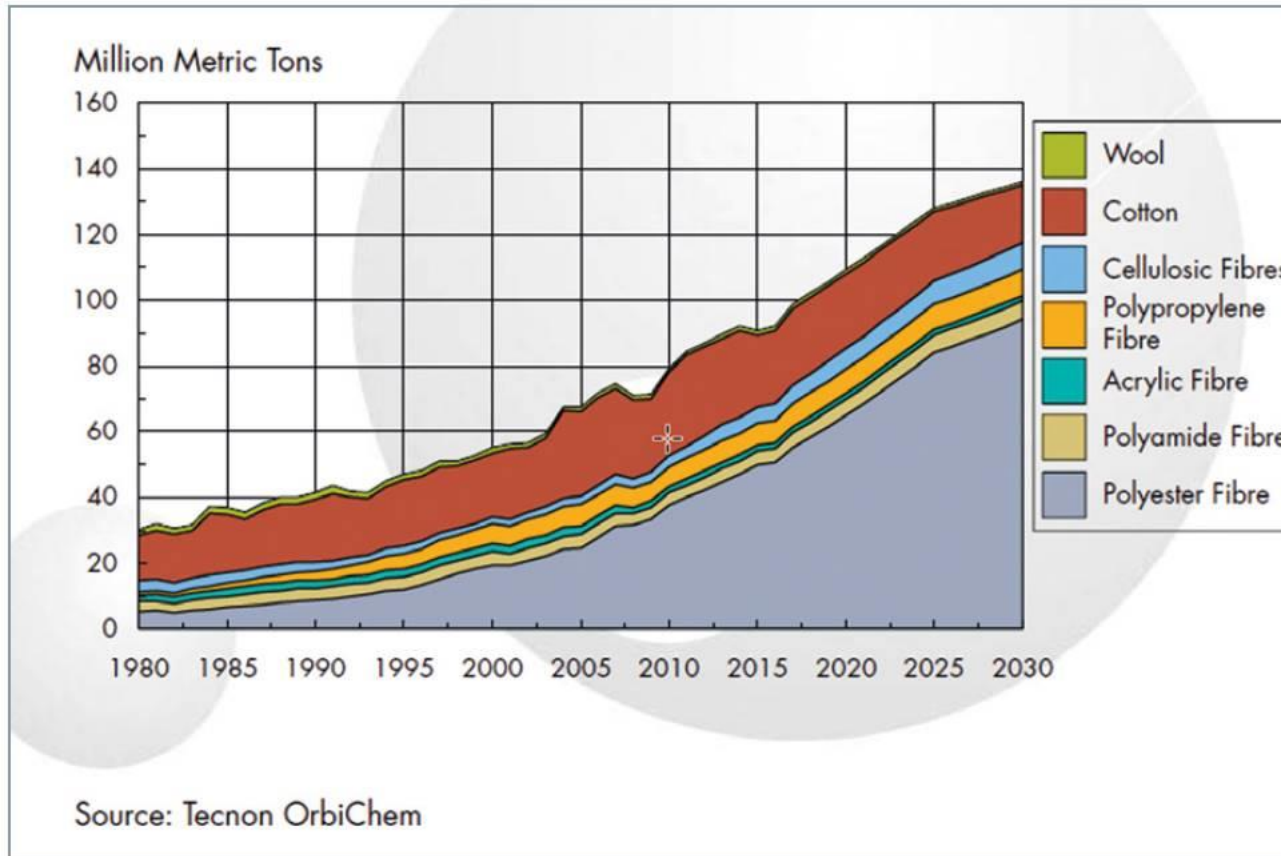
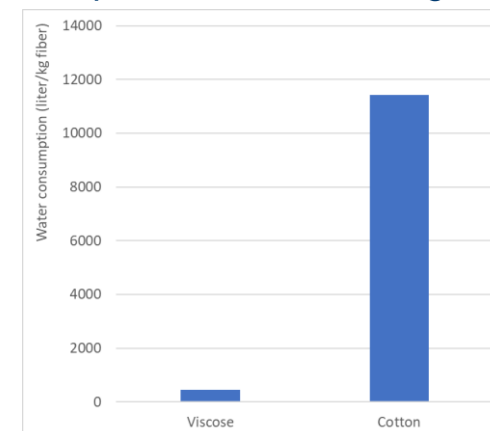


Figure 4: World fibre production 1980–2030 (Qin, Yang (Michelle); Tecnon OrbiChem 2018)

- Most of the textile fiber is based on fossil sources
- The cotton sources are limited due to requirement of large areas of land and water
- There is a need to substitute the fiber demand with alternative fiber

Water requirement for one kg of fiber

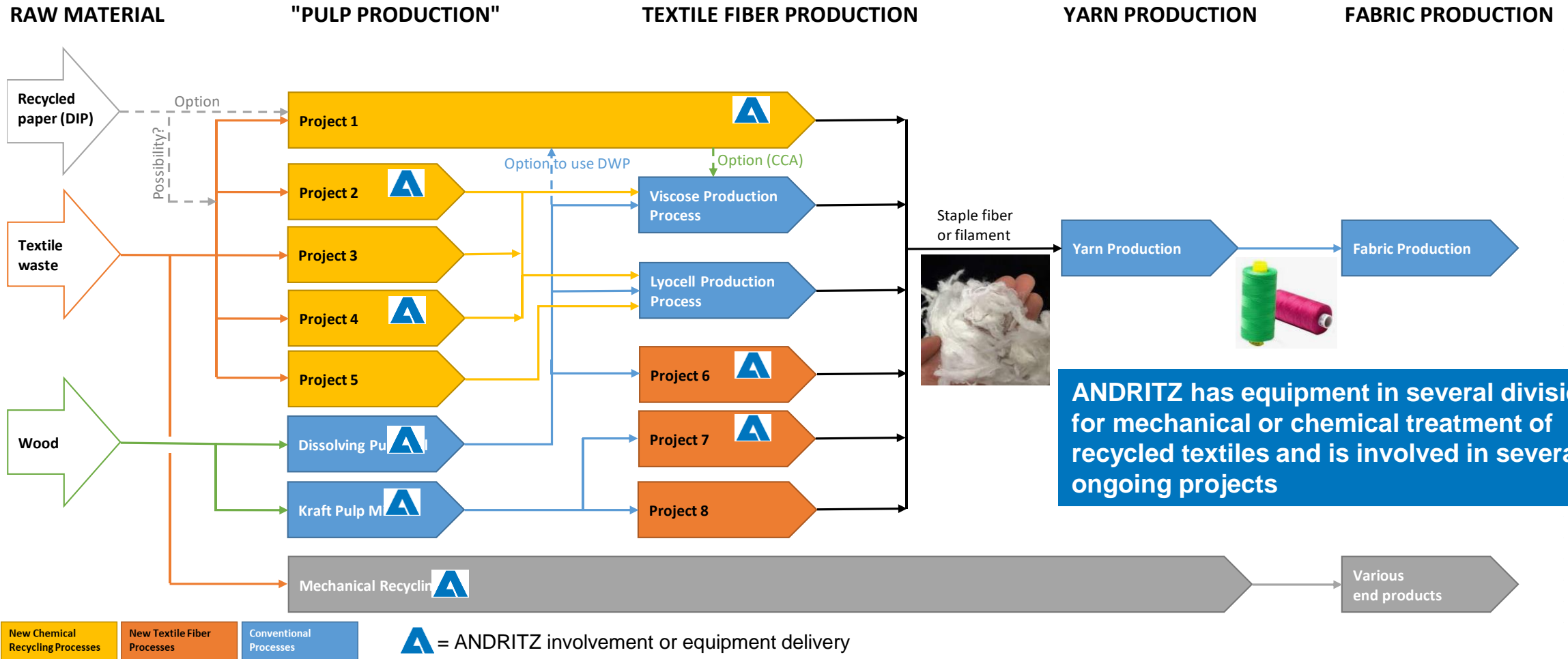


Data source: F. Haemmerle, "The Cellulose Gap" (The Future of Cellulose Fibres)

TEXTILE RECYCLING AND NEW SUSTAINABLE TEXTILE FIBER PROCESSES



ANDRITZ is involved in eight different highly innovative R&D projects



ANDRITZ has equipment in several divisions for mechanical or chemical treatment of recycled textiles and is involved in several ongoing projects

START-UP OF BRACELL PROJECT STAR - MAJOR INNOVATION IN DISSOLVING PULP PRODUCTION



- **Successful start-up** on September 9, 2021
- **Two swing pulp lines** with continuous digesters:
 - 2.8 mill. tpy Bleached Kraft Pulp or
 - 1.5 mill. tpy Dissolving Pulp (DP)
- Major **scale-up in DP production rate**
 - 830 to 2,900 adt/d per line
- Adds appr. 15% of global capacity in DP
- Major **boost for tree to textile activities**



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Digitalization



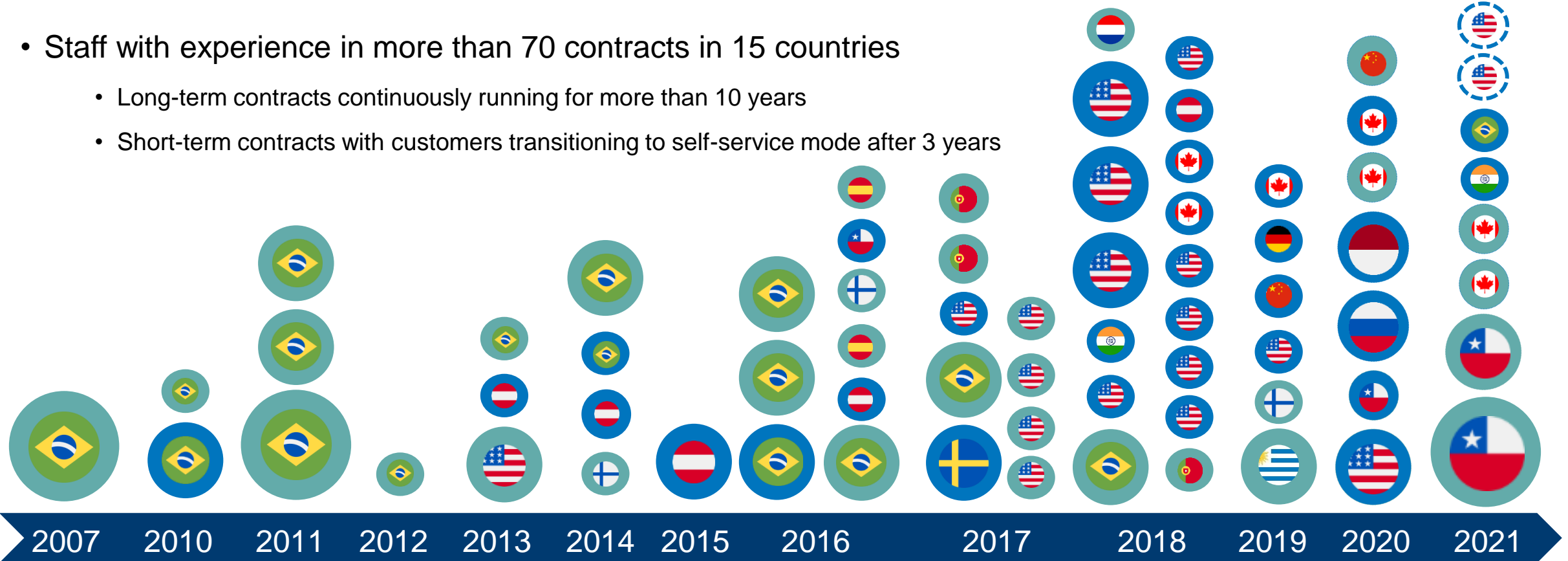
- Automation Solutions
- Asset Performance Management
- Autonomous Operation
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- ...



METRIS OPP: NEW CUSTOMERS ADDED EACH YEAR



Continuous improvement in our products and services for Asset Performance Management

- Staff with experience in more than 70 contracts in 15 countries
 - Long-term contracts continuously running for more than 10 years
 - Short-term contracts with customers transitioning to self-service mode after 3 years



 Pulp
 Pulp & Paper (integrated mills)

LEVELS OF AUTONOMY

Rapid development towards autonomous operations

● 2000-2010 ● 2010-2025 ● 2025 - >

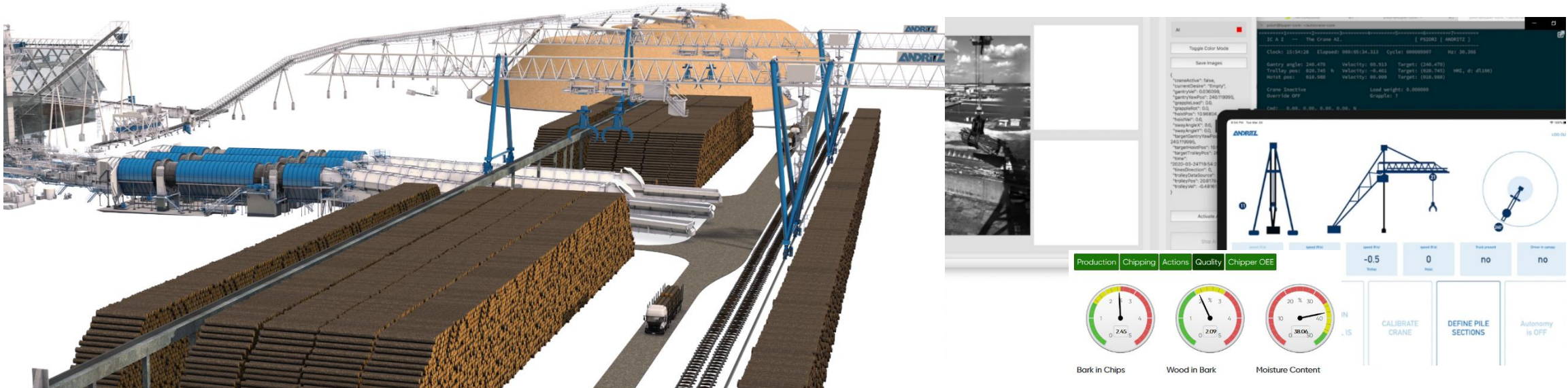
Level/	0	1	2	3	4	5
Name	NO AUTOMATION	OPERATOR ASSISTANCE	PARTIAL AUTOMATION	CONDITIONAL AUTOMATION	HIGH AUTOMATION	FULL AUTOMATION
Name (Informal)	Information	Hands On	Hands Off	Eyes Off	Mind Off	Full Autonomy
Description	Zero autonomy; the operator performs all control tasks.	Plant is controlled by the operator, but some automation is included in the plant design.	Plant has combined automated functions, like flow and temperature control, but the operator must remain engaged with the plant and monitor the situation at all times.	Operator is a necessity, but is not required to watch the displays continuously. The operator must be ready to take control at all times with notice.	The automation is capable of performing all control actions under certain conditions. The operator may have the option to control the plant.	The automation can control perform all control functions under all conditions. The operator may have the option to control the plant.
Level 4 Budget Cntrl/Plant Mgmt	●	→	●	→	→	●
Level 3 Mill wide balanced mill		●	→	●	→	●
Level 2 Adv.Process Control			●	→	●	→
Level 1 Controlled Mill			●	→	●	→
Level 0 Reliable Mill/Asset Health						

ARTIFICIAL INTELLIGENCE ENABLED AUTONOMOUS LOG CRANE OPERATION



WHY AI BASED AUTONOMOUS CRANE OPERATION?

- Elimination of truck traffic reduces operating costs and improves safety level of operation
- Adaptive first-in/first-out inventory management and raw material tracking from gate to cooking
- Optimization of pulp mill fiberline process by better feed rate, storage time, and wood classification control
 - Improved debarking for lower fiber loss and dirt count
 - Improved chip quality for lower screening loss and improved cooking performance
 - More uniform fiber cell wall thickness for better pulp properties
- One installation under commissioning (US) one order in manufacturing (EU)



OT Cyber Security requires different approach and solutions

ANDRITZ' JV Otorio has developed 3 leading products

Business
Network

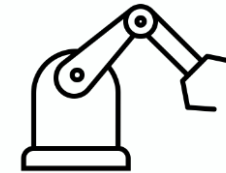
IT



PATCH

Production
Network

OT



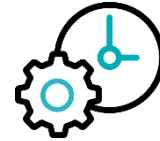
DON'T TOUCH!

spOT™ - Securing the digital machine lifecycle



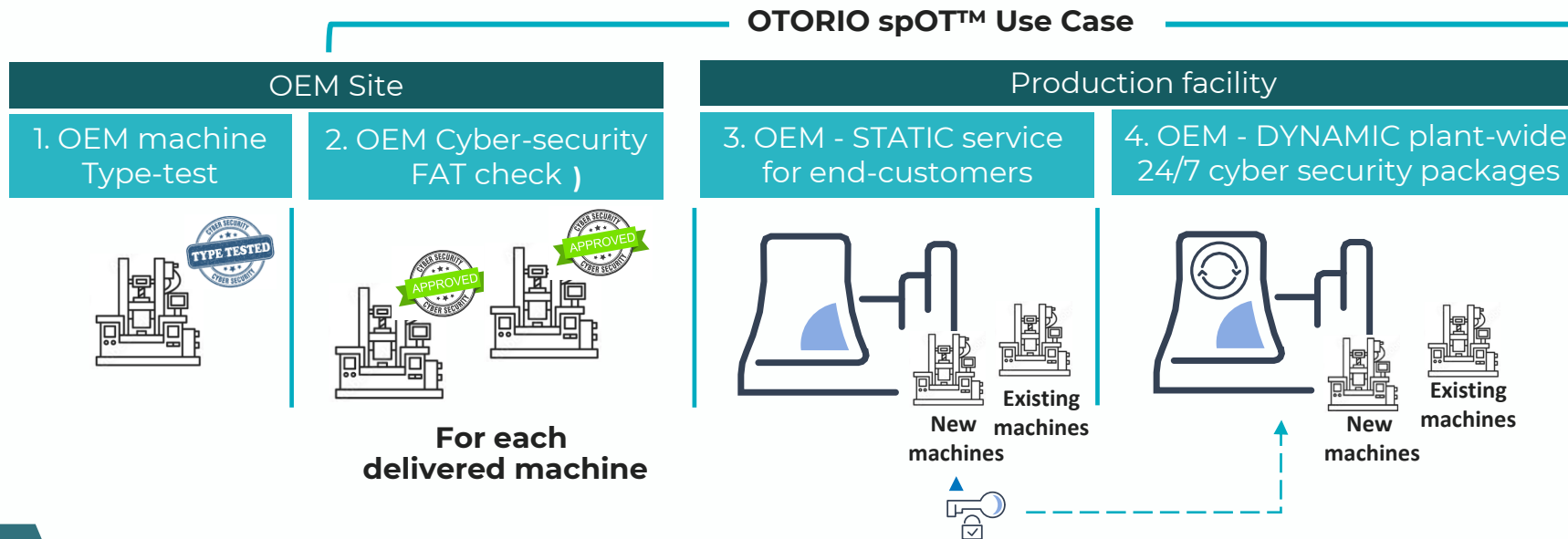
FAT check for every machine / delivery

- Becomes part of the OEM delivery- and quality procedures
- Checks the full machine against the relevant IEC62443/ NIST/NERC/ or add. standards as required requirements



Lifecycle Vulnerability Management As-a-Service

- Based on the „fingerprint“ of delivered machines, spOT™ checks cyclic this configurations against current threats and vulnerabilities.
- Cyclic cyber security risk potential evaluation of end customer machineries as an OEM service



RAM² - Dynamic cyber security orchestration platform

Continuous Proactive Protection of the Operational Network



Enriched asset inventory



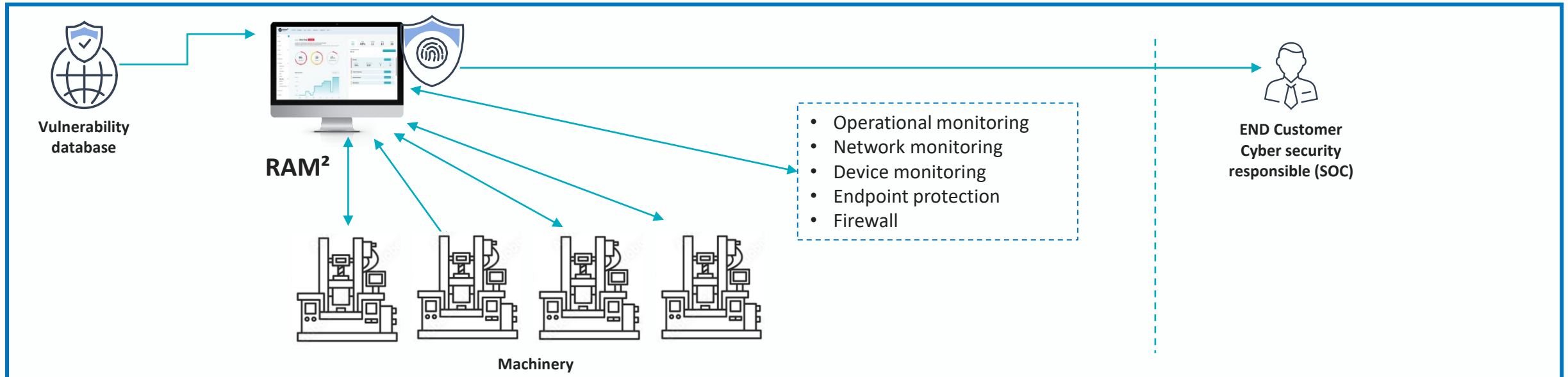
Feasible mitigation playbooks



OT security posture assessment



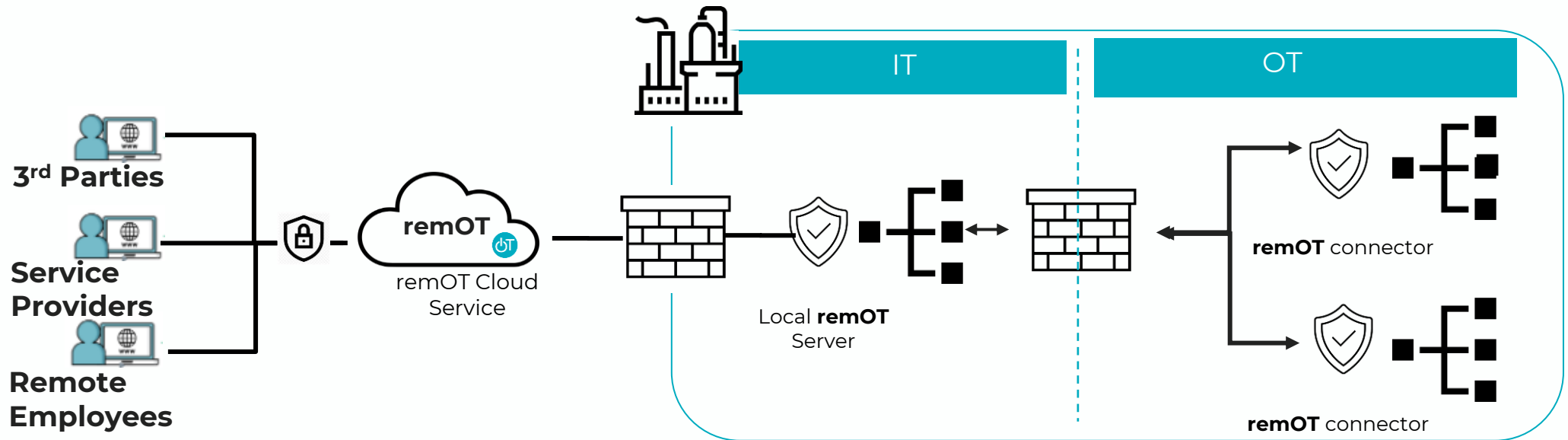
Compliance and audit reports



remOT™ - Secured remote access

Purposely designed to secure remote access to operational networks

- **Simplified** OT-centered deployment and usability
- **Zero Trust** access is granted only to pre-defined assets
- **Seamless & Scalable** web-based, clientless solution
- **Security-by-design** closes the door for attackers
- **Governance** allows for full audit and automatic monitoring
- **Fast ROI** by reducing maintenance costs and time



ROADMAP 2022-2024



Improve profitability and grow business volume

- **Continue profitable growth**
 - Revenue > 3,500 MEUR
 - EBITA > 10%
- **Increase share of service business to > 45%**
- **Grow with tree to textile and textile recycling opportunities**
- Transfer **Biorefinery/CircleToZero** into business opportunities for ANDRITZ
- **Improve project management capabilities**
- **Push Autonomous Mill Operation** to the next level



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MANY THANKS!

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