



MDF-Terpentin: eine Erfolgsbilanz

Holzwerkstoffkolloquium

Dresden, 11. Dezember 2025

CLASSEN Group

Floors For A Better Tomorrow.

www.classengroup.com

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Jimmy Konrad, Dr. Holger Heinrich, Martin Schwendy,
Christian Dümichen, Carsten Buhlmann
Fiberboard GmbH, Classen Gruppe
Baruth, Deutschland

Nasswäsche und Trocknerabgas bei Fiberboard in Baruth



Neue Grenzwerte für Emissionen in der Holzwerkstoffindustrie

- BVT-Merkblatt „Herstellung von Platten auf Holzbasis“
- Durchführungsbeschluss (EU) 2015/2119
- BVT- Schlussfolgerungen seit 24.11.2019 gültig
- Umgesetzt in TA-Luft von 1.12.2021
- Für MDF/ HDF deutliche **Verschärfung der Grenzwerte:**
 - Reduktion von **300mg/m³** auf **120mg/m³**
 - Durch Änderung Bezugswert von feuchten auf trocken weitere Verschärfung
120 mg/m³ entspricht bei 55°C und Abgastemperatur **101mg/m³** nach alter Messmethode
- Hauptkomponente der VOCs in der Holzwerkstoffindustrie: Terpene



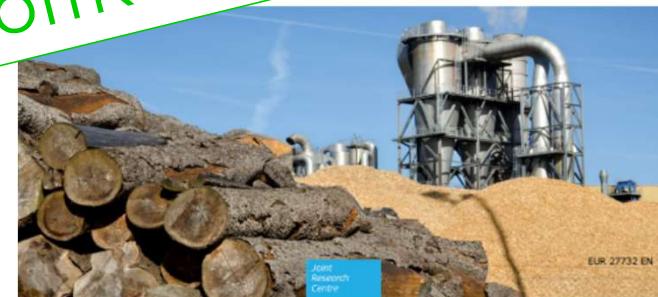
JRC SCIENCE FOR POLICY REPORT

Best Available Techniques (BAT)
Reference Document for the
Production of Wood-based Panels

Industrial Emissions Directive
2010/75/EU
(Integrated Pollution
Prevention and Control)

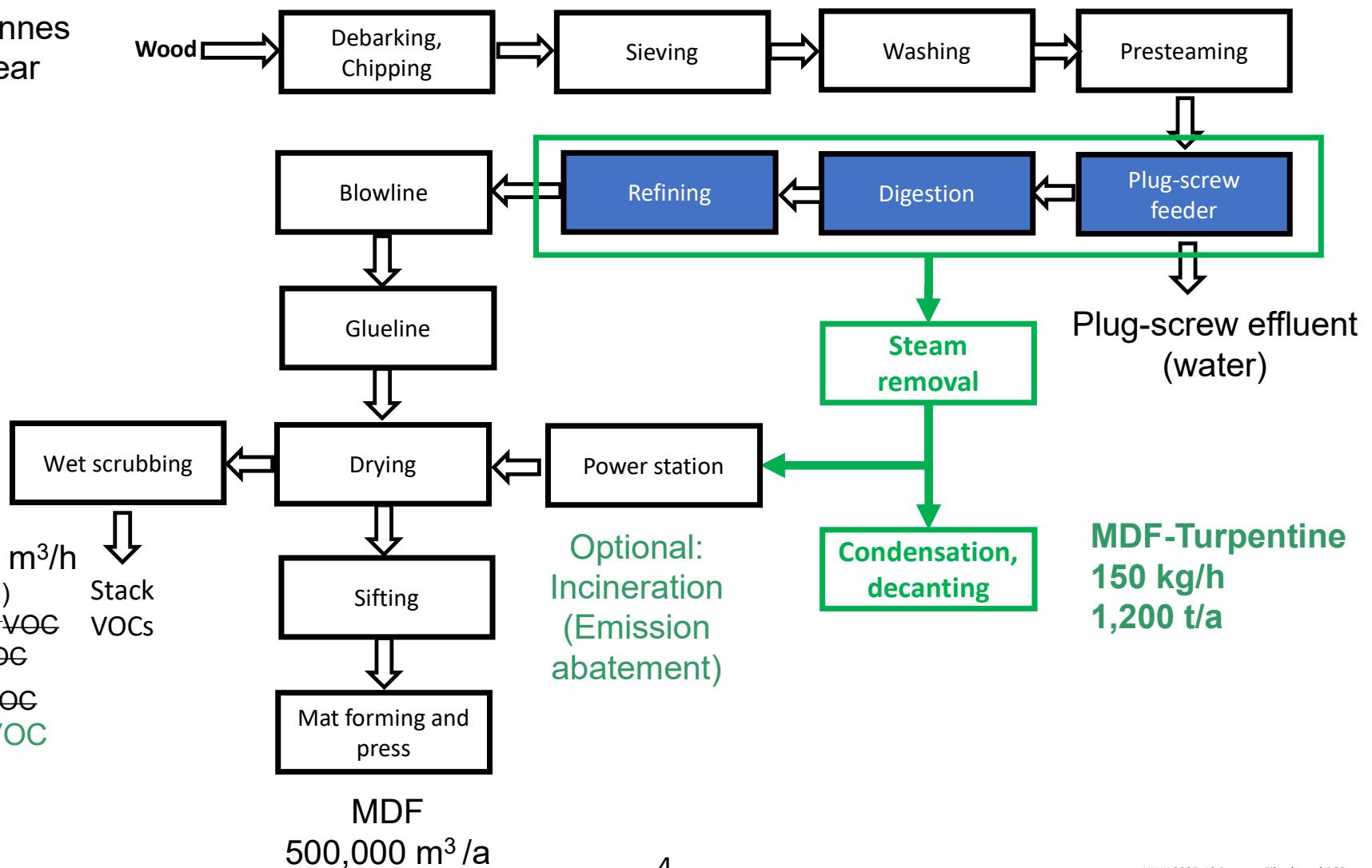
2016

Holzwerkstoffkolloquium 2023



MDF Prozess, MDF-Terpentin Produktion

400,000 tonnes
(dry) per year

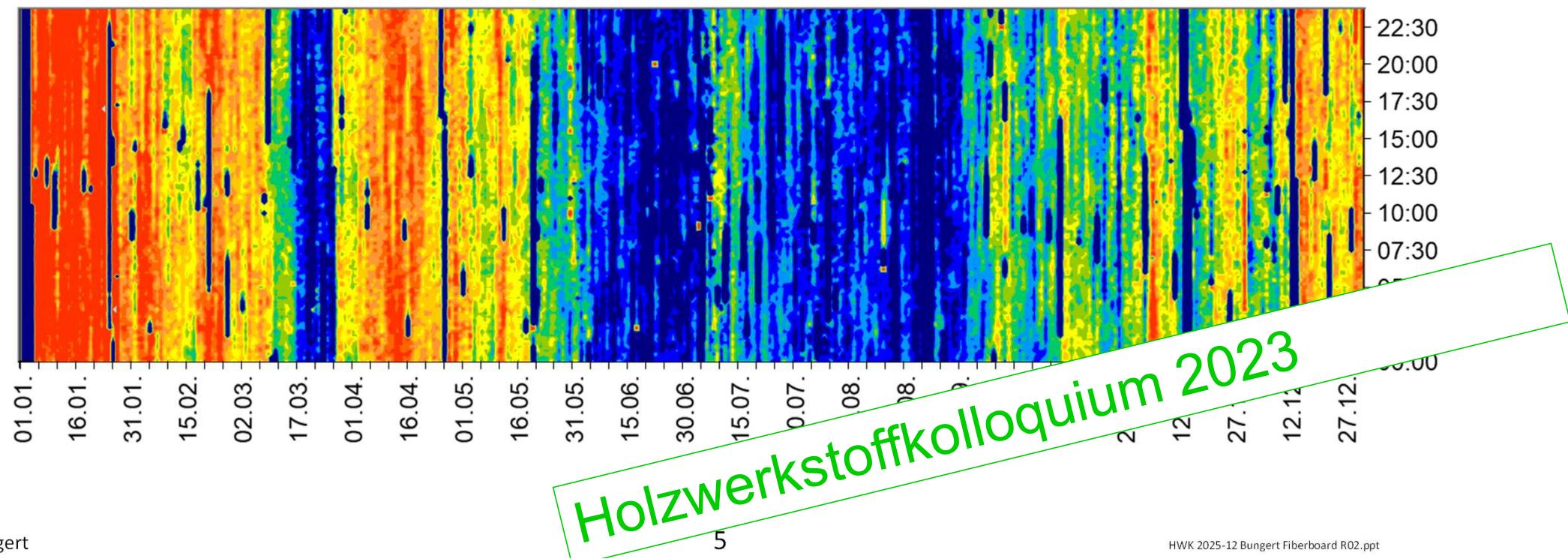


VOCs als C_{ges} 2017 in Baruth [mg/m³]

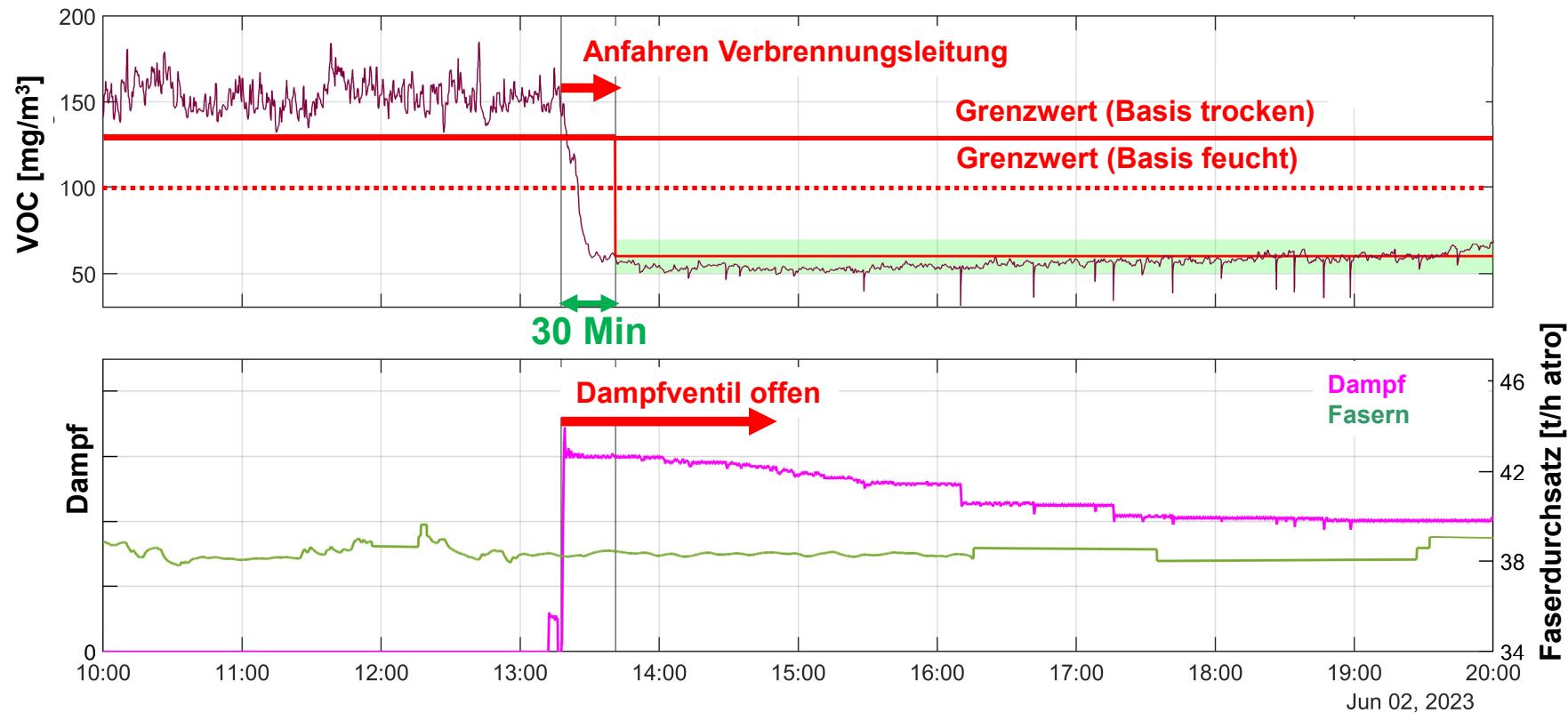


Blau: neuer Grenzwert wird eingehalten

Grün ,Gelb, Orange, Rot: Grenzwert überschritten



Einhalten und Unterschreiten Grenzwerte

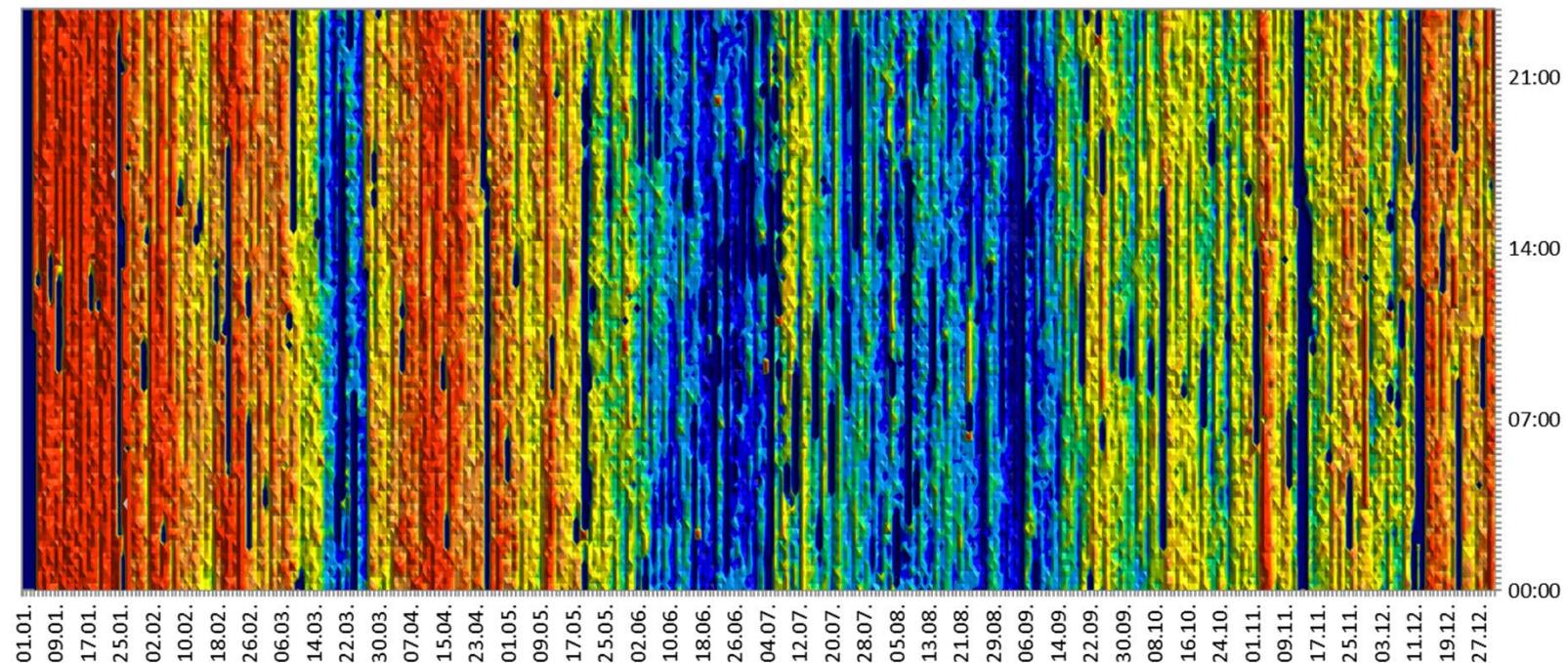


- ✓ Läuft im industriellen Dauerbetrieb seit 2023
- ✓ VOC Konzentration im Abgas hier auf 60 mg/m³ +/- 10 eingestellt
- ✓ Niedrigere Werte werden problemlos erreicht

VOCs als C_{ges} 2017 in Baruth [mg/m³]

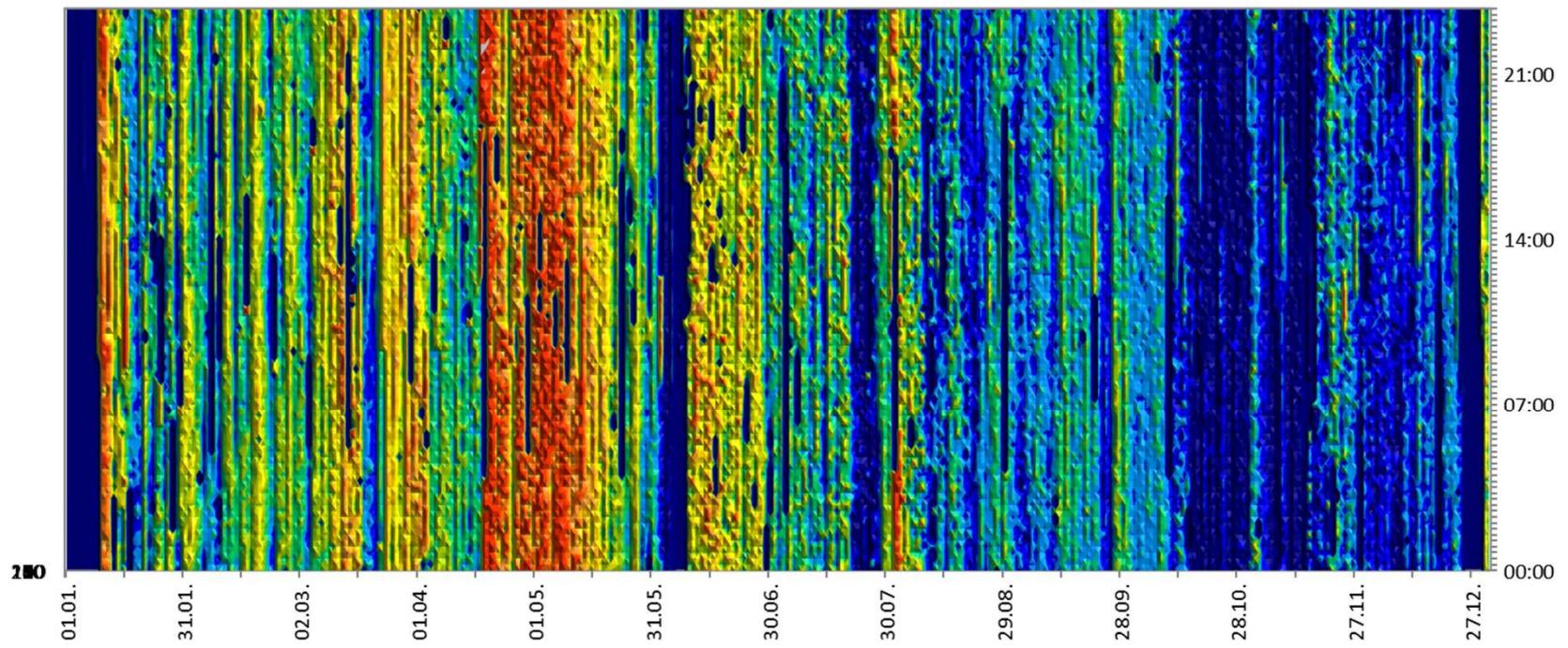
Blau: neuer Grenzwert wird eingehalten
Grün ,Gelb, Orange, Rot: Grenzwert überschritten

■ 0-10 ■ 10-20 ■ 20-30 ■ 30-40 ■ 40-50 ■ 50-60 ■ 60-70
■ 70-80 ■ 80-90 ■ 90-100 ■ 100-110 ■ 110-120 ■ 120-130 ■ 130-140
■ 140-150 ■ 150-160 ■ 160-170 ■ 170-180 ■ 180-190 ■ 190-200



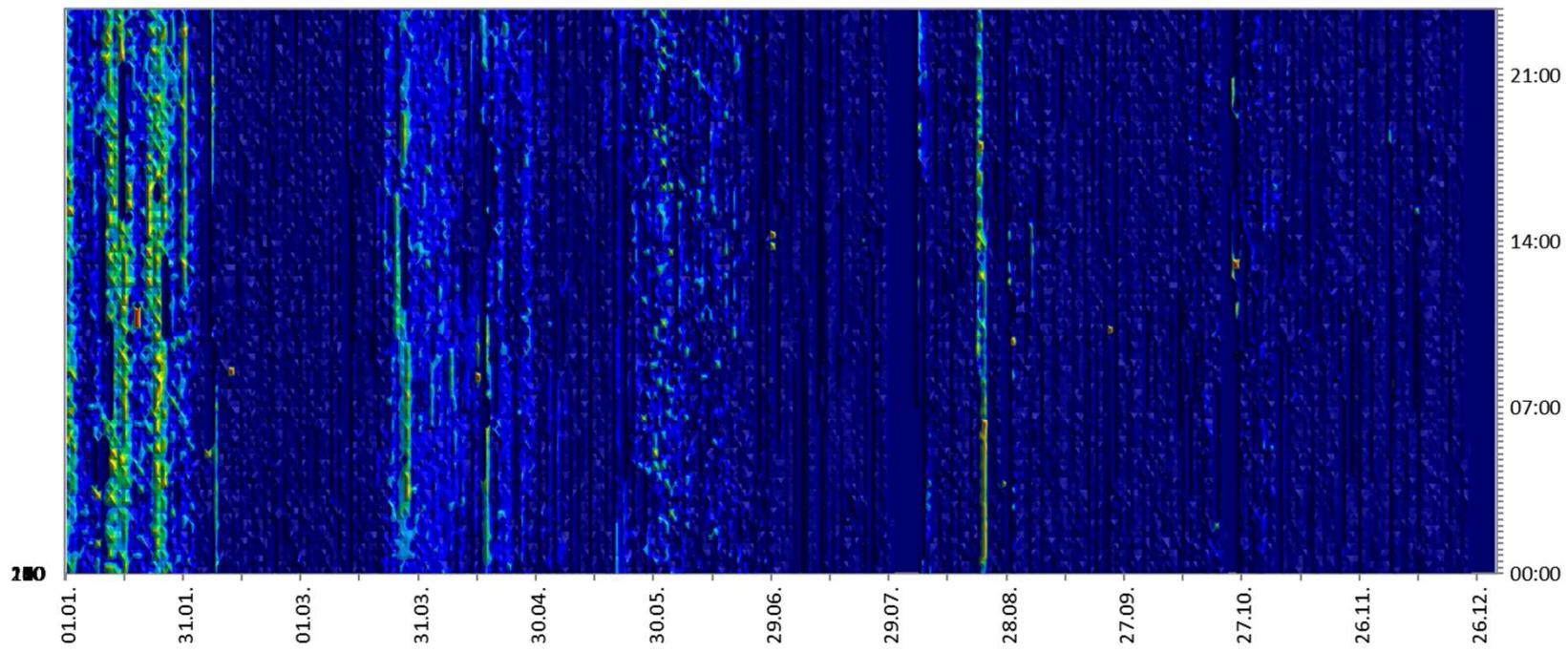
VOCs als C_{ges} 2023 in Baruth [mg/m³]

Blau: neuer Grenzwert wird eingehalten
Grün ,Gelb, Orange, Rot: Grenzwert überschritten

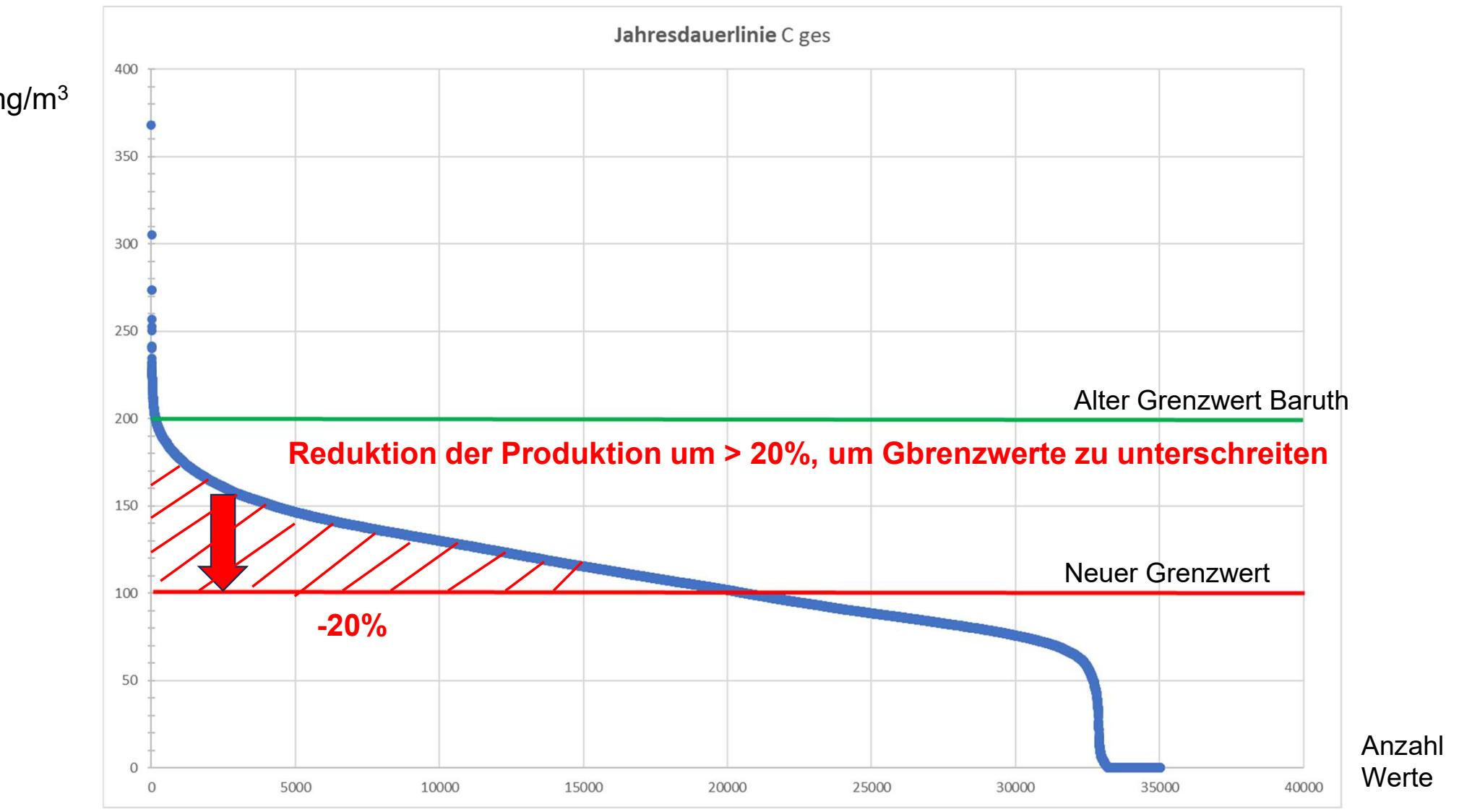


VOCs als C_{ges} 2024 in Baruth [mg/m³]

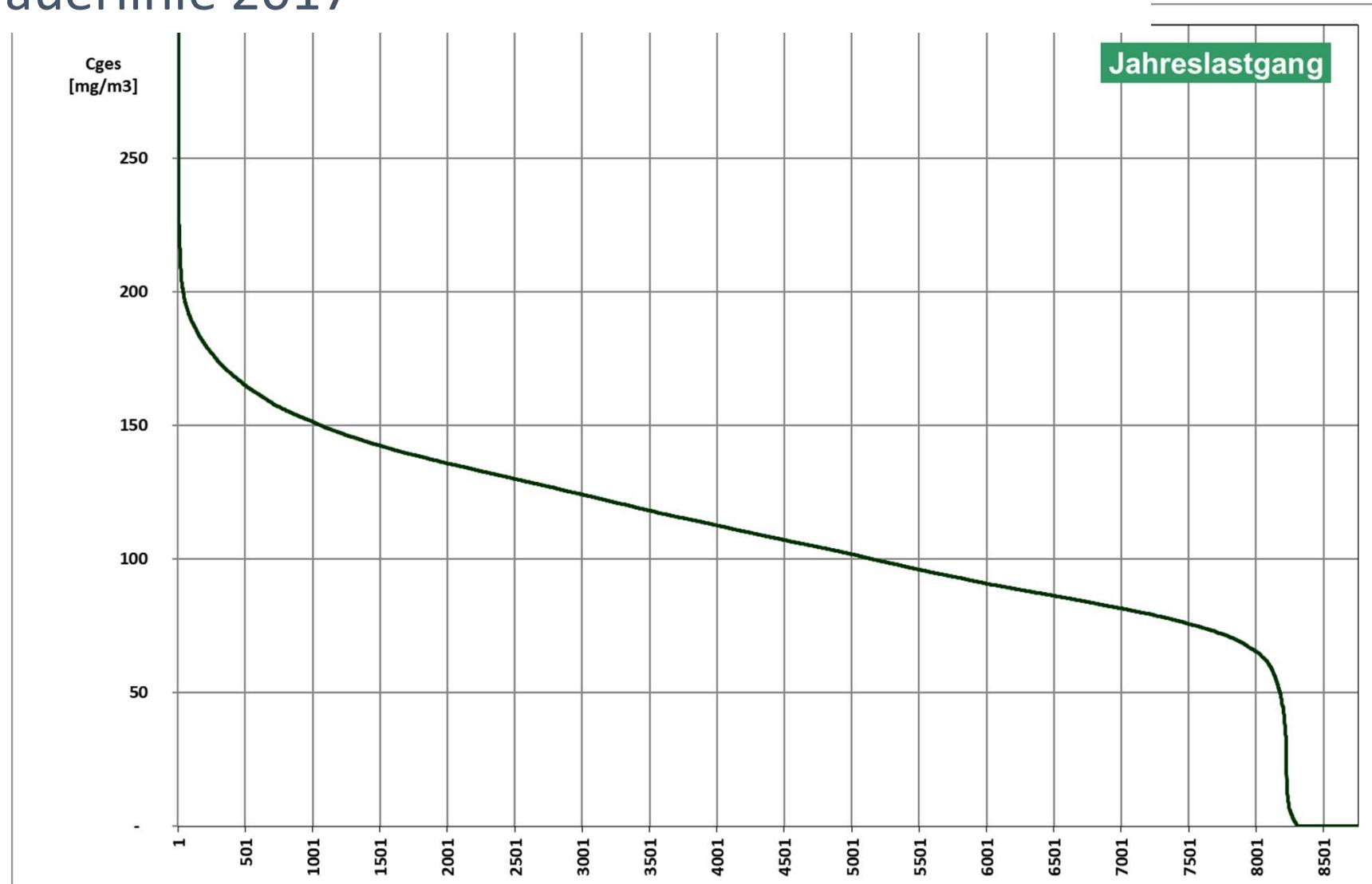
Blau: neuer Grenzwert wird eingehalten
Grün ,Gelb, Orange, Rot: Grenzwert überschritten



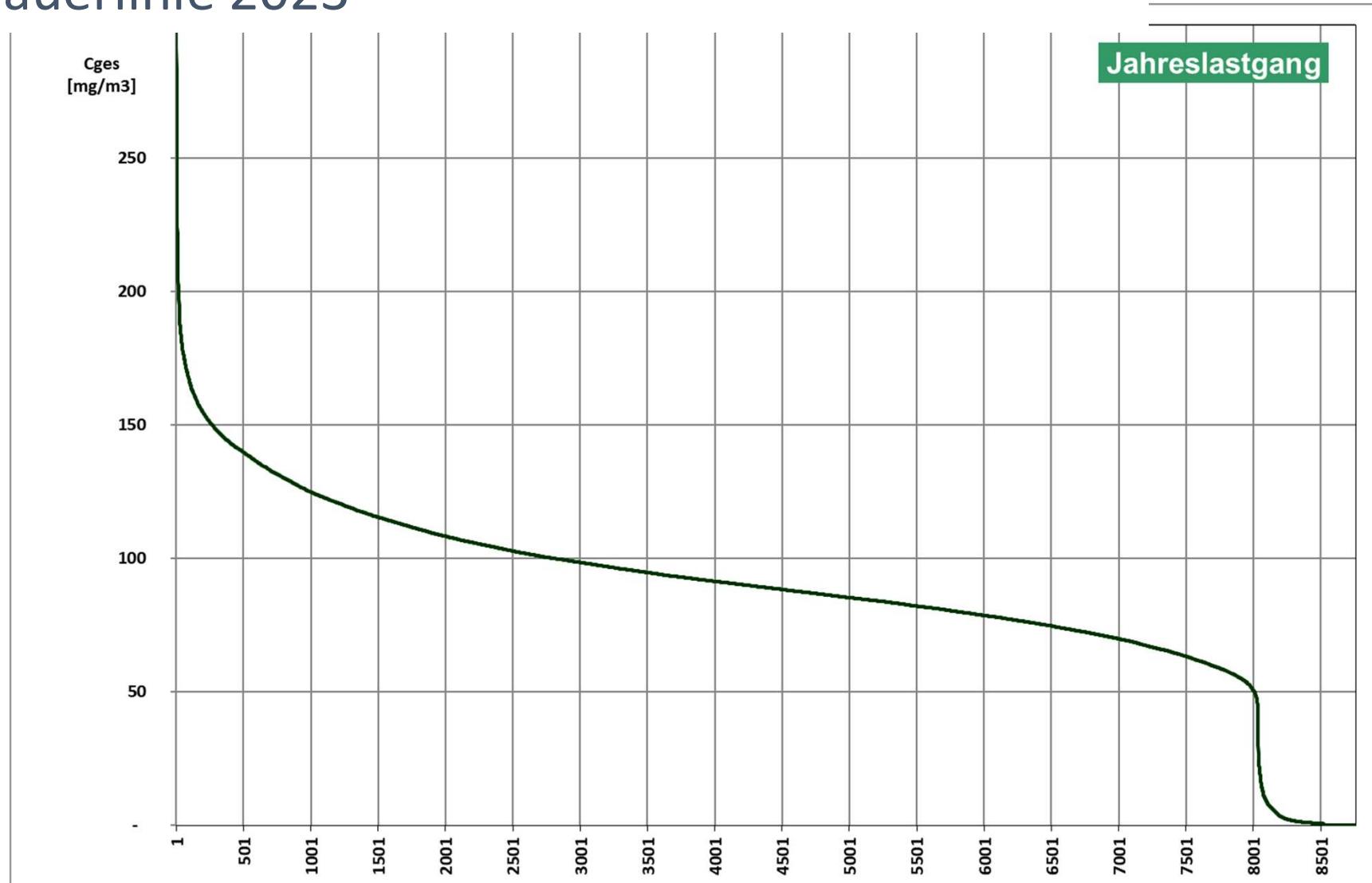
Jahresdauerlinie in mg/m³ (Daten nach Größe sortiert)



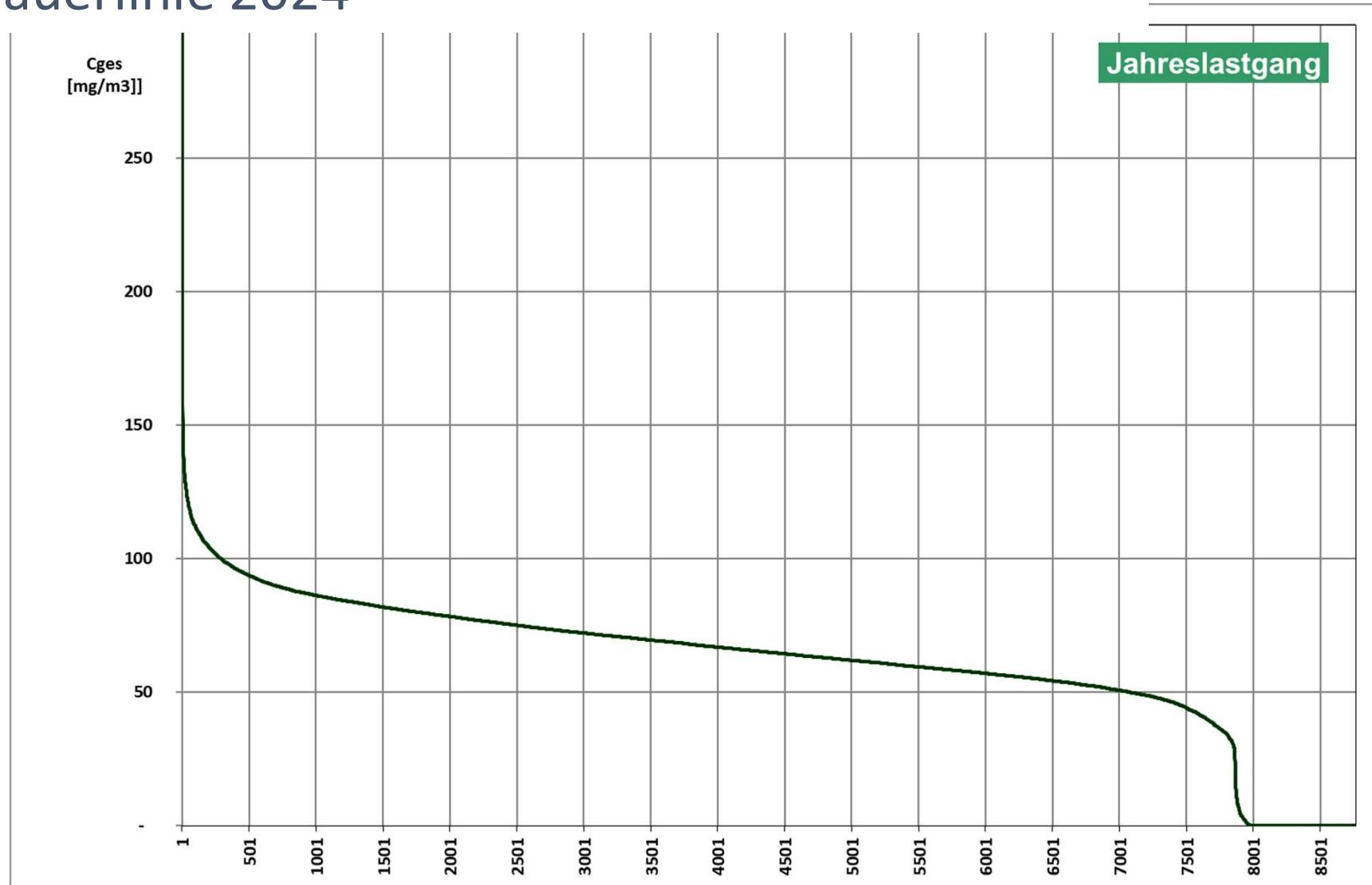
Jahresdauerlinie 2017



Jahresdauerlinie 2023



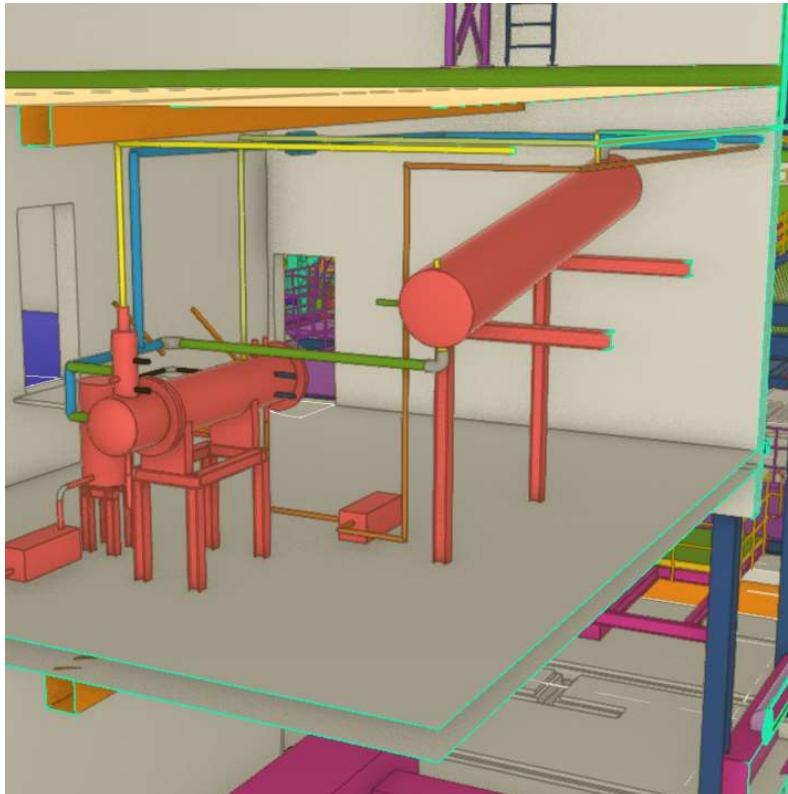
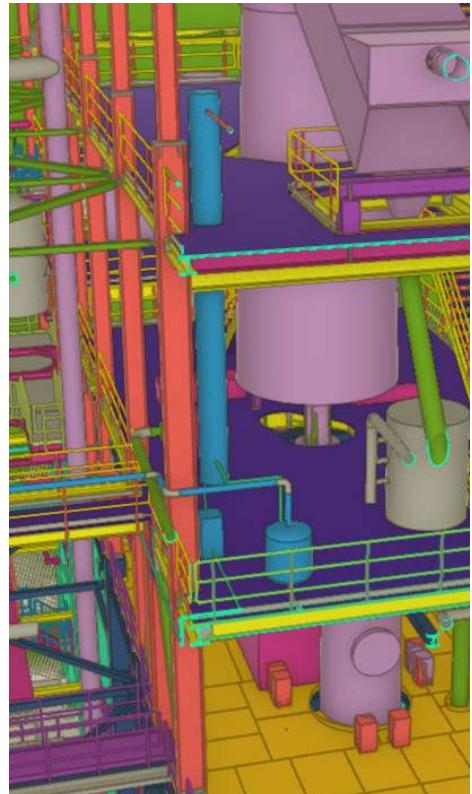
Jahresdauerlinie 2024



Jahresdauerlinie ab 2026

- Aktuell: Verbrennen des Dampfes im Kraftwerk
- Daher Regelung, um Dampf zu sparen
- Ab 2026: MDF-T Herstellung durch Kondensation mit Energierückgewinnung
- Dann Werte deutlich niedriger

MDF-Terpentin Anlage



- Einfache Anlage:
 - Zweistufige Kondensation, Ölabscheidung, Lagerung, LKW befüllung
 - Ölabscheidung unterhalb des Flammpunkts von 41°C
 - Verweilzeit im Ölabscheider unter 5 Minuten
- Keine Ex-Zonen!
- Inbetriebnahme: Q4.2026

MDF-T Pilotproduktion



Phasentrenner Und Terpentintank

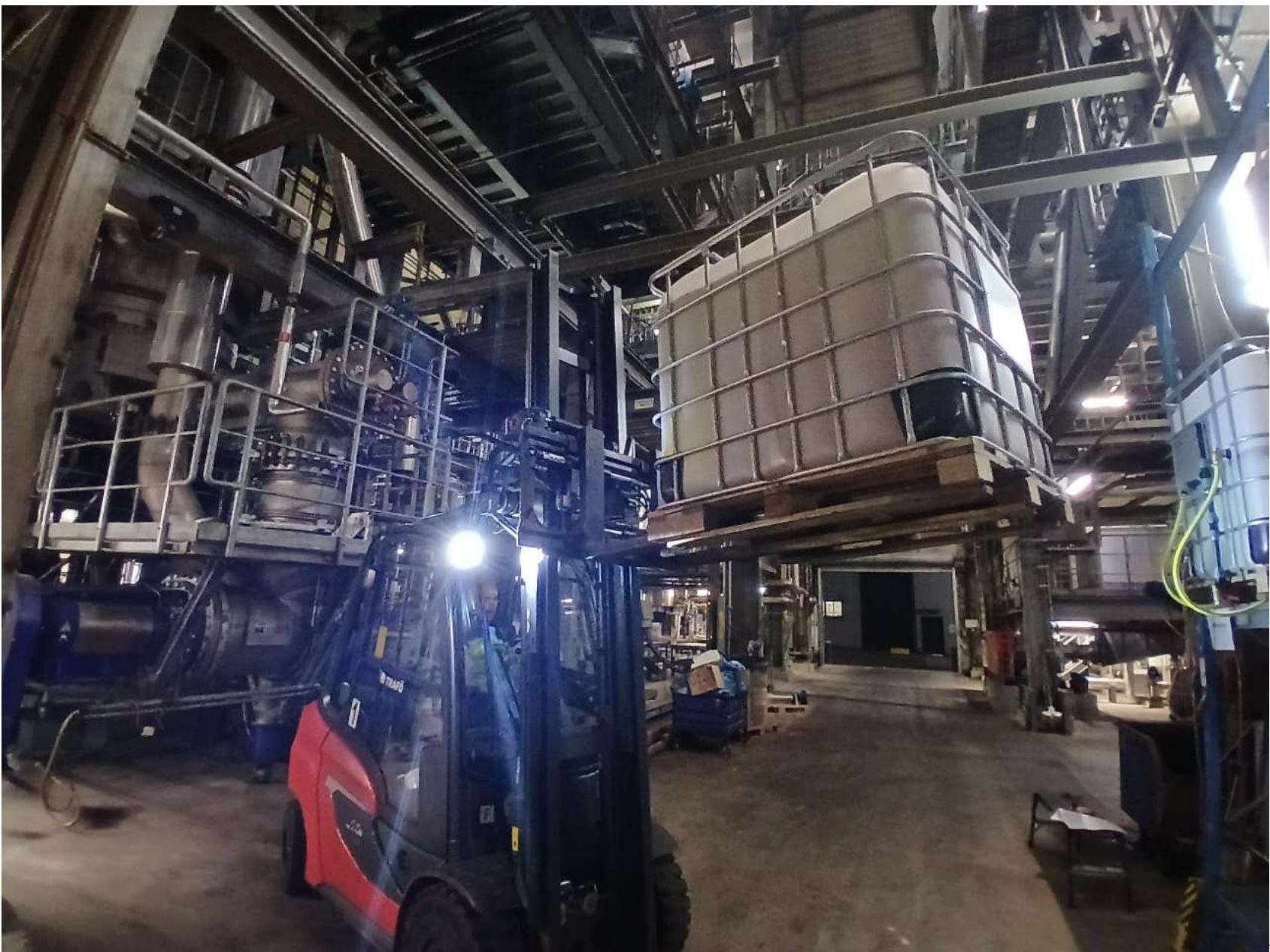


HWK 2025-12 Bungert Fiberboard R02.ppt



Bernd Bungert

ppt



Bernd Bungert

ppt

Qualitätssicherung mit Gaschromatographie

Product specification: MDF-Turpentine



DESCRIPTION

Turpentine produced by MDF-Turpentine process based on steam processing of wood chips obtained principally from scots pine (Waldkiefer, *Pinus Sylvestris*) obtained from the MDF plant of Fiberboard GmbH in Baruth/ Mark, Germany.

SPECIFICATION

Appearance :	Clear	
Colour :	Almost colourless, slightly yellow	
Alpha Pinene content [%] :	47 (standard value);	40 (min)
Beta Pinene Content [%]:	5 (standard value);	2 (min)
Delta 3 Carene Content [%]:	30 (standard value);	37 (max)
Limonene content [%]:	4 (standard value)	
Sulfur content [ppm]:	3-3.3 (standard value);	3.5 (max)
Water content [%]:	0 (standard value);	0.1 (max)

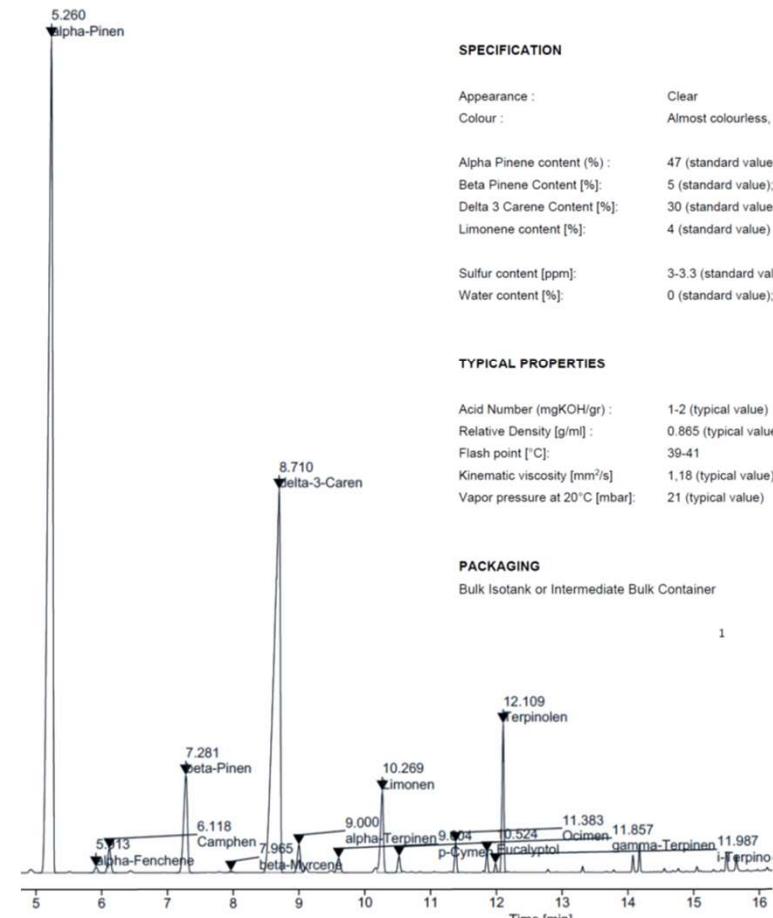
TYPICAL PROPERTIES

Acid Number (mgKOH/gr) :	1.2 (typical value)
Relative Density [g/ml] :	0.865 (typical value)
Flash point [°C]:	39-41
Kinematic viscosity [mm²/s]	1.18 (typical value)
Vapor pressure at 20°C [mbar]:	21 (typical value)

PACKAGING

Bulk Isotank or Intermediate Bulk Container

1
Clasen MDF-Turpentine FDD 804
Author: Dr. Bernd Bungert
Approved: A. Hennig
Date: 2024-10-15



IBC Lagerung, Transportlogistik, REACH



Safety data sheet
according to Regulation (EC) No 1907/2006, Article 31

Printing date 30.10.2024

Version number 1

Revision: 30.10.2024

Page 1/12

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

· Trade name: **MDF Turpentine**

· EC number:

932-349-8

· Registration number 01-2119553060-53-X

· UFI: Not applicable. Annex VII of the CLP Regulation does not apply.

MDF Turpentine

EC Number: 932-349-8/ Registration Number 01-2119553060-53-X

Formulation of odourants and odour end products, Intermediate, Industrial end use of detergents and cleaning agents

Details of the manufacturer:

Fiberboard GmbH, An der Birkenpfuhlheide 4, D-15837 Baruth/Mark, Deutschland

Tel. +49 33704 609-00, info@fiberboard.de, <https://classengroup.com/>



2.1 Classification of the substance or mixture Classification according to Regulation (EC) No 1272/2008

GHS02 flame

Flam. Liq. 3 H226 Flammable liquid and vapour.

GHS08 health hazard

Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.

GHS09 environment

Aquatic Chronic 2 H411 Toxic to aquatic life with long lasting effects.

GHS07

Acute Tox. 4 H312 Harmful if swallowed.

Acute Tox. 4 H312 Harmful in contact with skin.

Acute Tox. 4 H312 Harmful if inhaled.

Skin Irrit. 2 H315 Causes skin irritation.

Eye Irrit. 2 H319 Causes serious eye irritation.

Skin Sens. 1 H317 May cause an allergic skin reaction.

2.2 Label elements
Labelling according to Regulation (EC) No 1272/2008
The substance is classified and labelled according to the CLP regulation.
Hazard pictograms



Signal word

Hazard statements

H226 Flammable liquid and vapour.

H312+H312+H332 Harmful if swallowed, in contact with skin or if inhaled.

H315 Causes skin irritation.

H317 May cause an allergic skin reaction.

H319 May be fatal if swallowed and enters airways.

H411 Toxic to aquatic life with long lasting effects.

Precautionary statements

P210 Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.

P233 Take action to prevent static discharges.

P234 Avoid breathing dust/vapours/spray.

P235 Wash thoroughly after handling.

P236 Wear protective gloves / eye protection / face protection.

P237 If skin irritation occurs: Call a POISON CENTER/doctor if you feel unwell.

P238 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P239 If skin irritation or rash occurs: Get medical advice/attention.

P261 Collect spillage.

P262 Store in a well-ventilated place. Keep cool.

P263 If in eyes: Rinse cautiously with water for several minutes.

P264 If skin irritation persists: Get medical advice/attention.

P301+P312+P330 IF SWALLOWED: Do NOT induce vomiting.

P301+P312+P331+P332 IF INHALED: Remove person to fresh air and keep comfortable for breathing.

P301+P312+P333+P334 IF SKIN (OR HAIR) IRITATION OCCURS: Wash with plenty of water.

P301+P312+P335 IF SWALLOWED AND PERSON IS UNCONSCIOUS OR HAS SEIZURES: Do NOT induce vomiting. Give water to drink.

P301+P312+P335 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P301+P312+P335 IF SKIN (OR HAIR) IRITATION OCCURS: Get medical advice/attention.

P311 Collect spillage.

P312 Store in a well-ventilated place. Keep cool.

P313 If in eyes: Rinse cautiously with water for several minutes.

P314 If skin irritation persists: Get medical advice/attention.

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MDF-T Pilotproduktion: Prozessstabilität, Marktbemusterung

- Pilotproduktion: 5 kg/h ... 40 kg/h (40...360 t/a, bis zu $\frac{1}{4}$ der Produktionskapazität)
- In Betrieb seit 2021
- Kontinuierlicher Betrieb seit 2023
- Systematische und umfangreiche Untersuchung:
 - Qualitätsparameter der MDF-Produktion
 - Prozessparameter der MDF Production
 - Prozessparameter MDF-T Prozess, Ausbeute
 - Holzzusammensetzung (Kiefer, Fichte, Hartholzanteil und -typ), Feuchtigkeit, Herkunft, saisonale Einflüsse
 - Nebenprodukte aus dem Holzaufschluss
 - (...)
- Umfassendes Prozessverständnis und Prozessstabilität erreicht
- Die Qualität von MDF-Turpentine is vergleichbar mit Balsam Terpentin

MDF-T Produktspezifikation

Product specification: MDF-Turpentine



DESCRIPTION

Turpentine produced by MDF-Turpentine process based on steam processing of wood chips obtained principally from scots pine (Waldkiefer, *Pinus Sylvestris*) obtained from the MDF plant of Fiberboard GmbH in Baruth/ Mark, Germany.

SPECIFICATION

Appearance :	Clear	
Colour :	Almost colourless, slightly yellow	
Alpha Pinene content [%]:	47 (standard value);	40 (min)
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Delta 3 Carene Content [%]:	30 (standard value);	37 (max)
Limonene content [%]:	4 (standard value)	
Sulfur content [ppm]:	3-3.3 (standard value);	3.5 (max)
Water content [%]:	0 (standard value);	0,1 (max)

TYPICAL PROPERTIES

Acid Number (mgKOH/gr) :	1-2 (typical value)
Relative Density [g/ml] :	0.865 (typical value)
Flash point [°C]:	39-41
Kinematic viscosity [mm ² /s]	1,18 (typical value)
Vapor pressure at 20°C [mbar]:	21 (typical value)

PACKAGING

Bulk Isotank or Intermediate Bulk Container

Sicherheitsdatenblätter, REACH



Seite: 1/12

Sicherheitsdatenblatt
gemäß Verordnung (EG) Nr. 1907/2006, Artikel 31

Druckdatum: 30.10.2024 Versionsnummer 1 überarbeitet am: 30.10.2024

ABSCHNITT 1: Bezeichnung des Stoffs beziehungsweise des Gemischs und des Unternehmens

1.1 Produktidentifikator

· Handelsname: **MDF-Terpentin, MDF Turpentine**

· EG-Nummer:

932-349-8

· Registrierungsnummer 01-2119553060-53-X

· UFI: Entfällt. Anhang VII der CLP-Verordnung nicht anwendbar.



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Safety data sheet
according to Regulation (EC) No 1907/2006, Article 31

Printing date 30.10.2024 Version number 1 Revision: 30.10.2024

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

· Trade name: **MDF Turpentine**

· EC number:

932-349-8

· Registration number 01-2119553060-53-X

· UFI: Not applicable. Annex VII of the CLP Regulation does not apply.



Page : 1/12

Fiche de données de sécurité
selon règlement (CE) N° 1907/2006, Article 31

Date d'impression : 30.10.2024 Numéro de version 1 Révision: 30.10.2024

RUBRIQUE 1: Identification de la substance/du mélange et de la société/de l'entreprise

1.1 Identificateur de produit

· Nom du produit : **Térébenthine MDF**

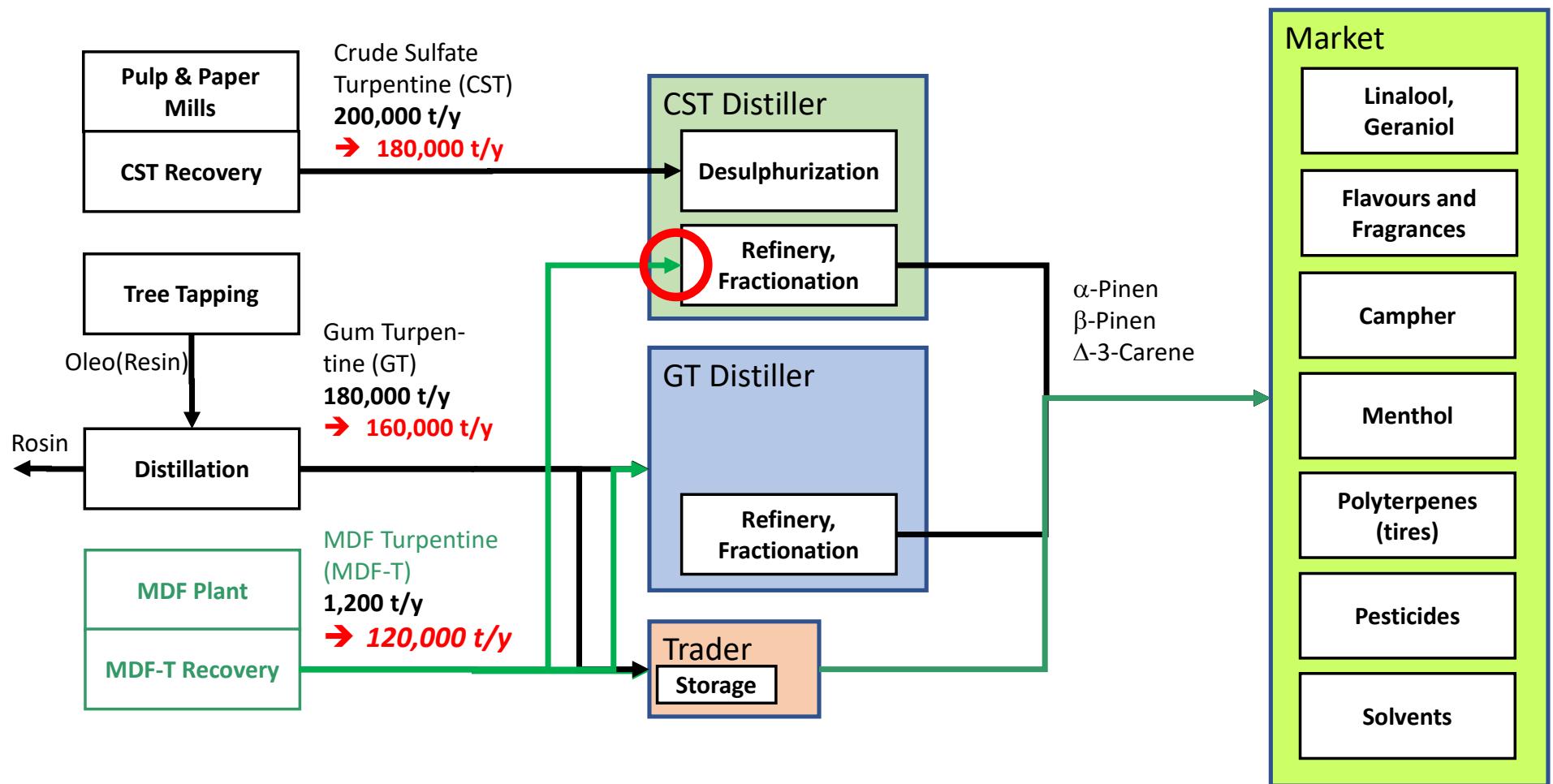
· Numéro CE :

932-349-8

· Numéro d'enregistrement : 01-2119553060-53-X

· UFI: Pas applicable. Annexe VII du règlement CLP non applicable.

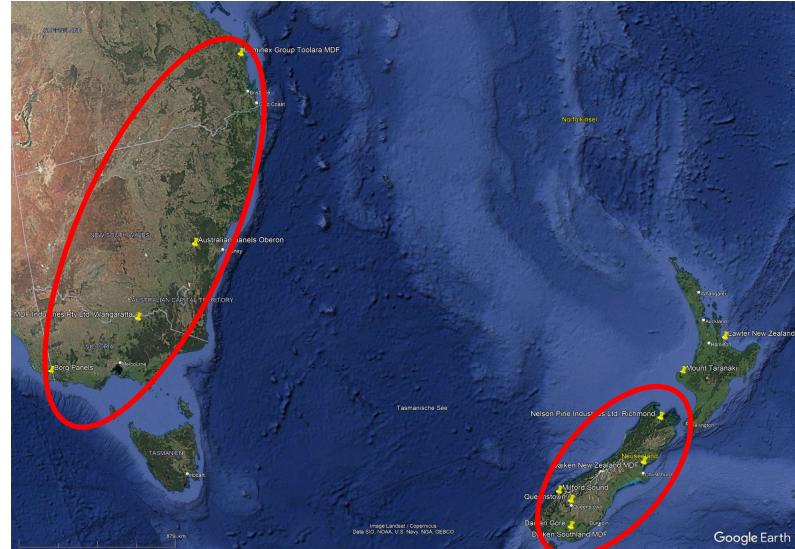
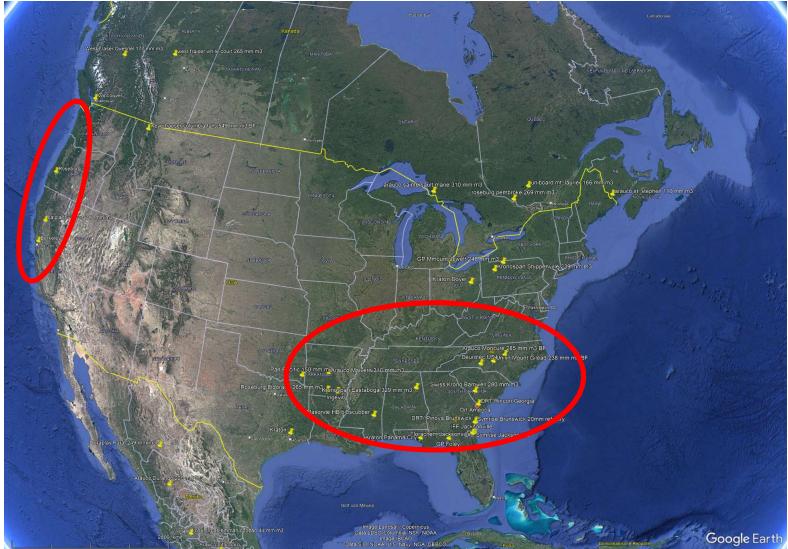
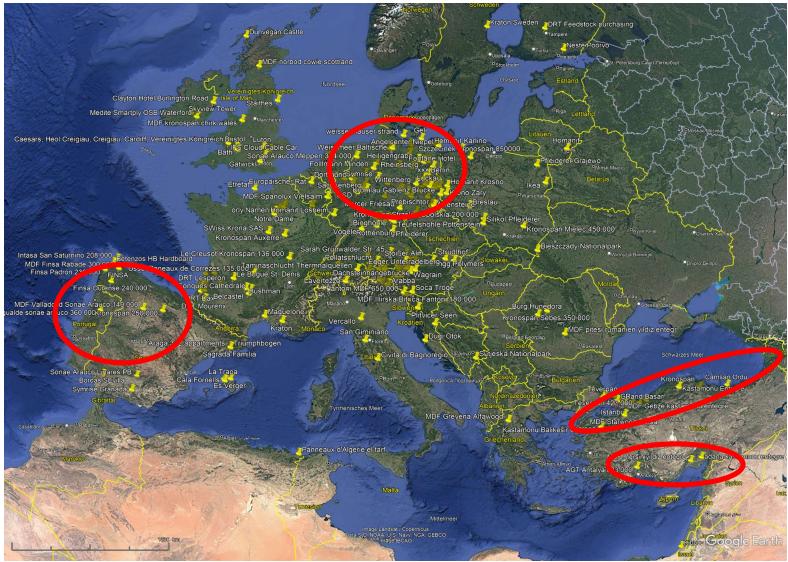
Markt für Terpentin (Sulfat Terpentin, Balsam Terpentin) 2026



Pine Chemicals Association international meeting San Diego

- ✓ 21.-23.9.2025
 - ✓ Branchentreffen für Terpentin, Harzsäuren, Tallöl und Folgeprojekte
 - ✓ Alle großen Terpentinkäufer vertreten
-
- ✓ **Große Nachfrage**
 - ✓ **Vermarktung Terpentin problemlos**
 - ✓ **MDF-Terpentin ist bereit für den Markteintritt**

MDF-T Produzenten, Schlüsselmärkte, Fokuskunden



Lizenzprojekte

- Classen entwickelt Leuchtturmprojekte mit Fokuskunden
- Systematische Vermarktung mit einem Vertriebspartner startet in 2026
- Aktuelle Leuchtturmprojekte
 - North America 1 (*Pinus Palustris, Pinus Taeda*)
 - North America 2 (*Pinus Taeda, MDF-T instead of RTO (thermal oxidization)*)
 - South America (*Pinus Taeda & Eliottii*)
 - Europe Southwest (*Pinus Pinaster*)
 - Europe Middle and North (*Pinus Sylvestris*)
 - Türkiye 1 (*Pinus Brutia*)
 - Türkiye 2 (*Pinus Brutia & Pinus Sylvestris*)
 - Australia and New Zealand (*Pinus Radiata*)
- Typische Kapazität: 500 – 1 200 t/a
- Zusammensetzung und Marktpreis je nach Kiefernart

Marktentwicklung Lizenzvergabe

- Projektentwicklung
 - Aktuell: Leuturmprojekte mit Fokuskunden
 - Ab 2026:
 - Anlagenbauer/ Apparatelieferant
 - Vertriebsunternehmen Technologie
- Lizenzen:
 - Direkt von Classen
 - Über Anlagenbauer/ Apparatelieferant oder
 - Vertriebsunternehmen Technologie
- Technologietransfer:
 - By Classen
 - Durch Anlagenbauer/ Apparatelieferant
- Bau und Finanzierung
 - Lizenznehmer oder Kontraktor oder Terpentinkäufer
- MDF-Terpentin Verkauf
 - Durch den Lizenznehmer (MDF Hersteller)
 - „Auktion“

INCITE, EU Gesetzgebung

The screenshot shows the homepage of the Innovation Centre for Industrial Transformation and Emissions (INCITE) website. At the top, there is a header with the European Commission logo, a 'Log in' button, and a search bar. Below the header, the main navigation menu includes links for Home, About us, Innovative techniques, How to participate, FAQ, and News. A large graphic featuring overlapping colored circles (orange, yellow, green, blue) serves as the background for the main content area. The main title 'European Innovation Centre for Industrial Transformation and Emissions' is displayed prominently. Below the title, a brief description states: 'INCITE promotes the uptake of innovative technologies to achieve decarbonisation, depollution, increased resource efficiency and circular economy in large industrial plants.' To the right, there is a 'My innovative techniques' button and an 'Add new Innovative technique' button. A table below lists two entries under 'Innovative Technique': 'Medium density fibreboard: VOC reduction and turpentine production (project part 1)' and 'Medium density fibreboard: VOC reduction and turpentine production (project part 2)', each associated with a creator (n00fhwdk) and a status (Under revision). The table has columns for Innovative Technique, Creator, Status, and Actions.

Innovative Technique	Creator	Status	Actions
Medium density fibreboard: VOC reduction and turpentine production (project part 1)	n00fhwdk	Under revision	
Medium density fibreboard: VOC reduction and turpentine production (project part 2)	n00fhwdk	Under revision	

INCITE, EU Gesetzgebung

Innovation Centre for Industrial Transformation and Emissions

| Home | About us | Innovative techniques | How to participate | FAQ | News |

My innovative techniques

Home > Innovative Techniques > Medium Density Fibreboard: VOC Reduction and Turpentine Production (project Part 1)

Medium density fibreboard: VOC reduction and turpentine production (project part 1)

VOCs, especially terpenes form harmful photooxidants. BATs rule strict emission limits including the wood-based panels industry. For MDF production sites with a high rate of pine as raw material meeting these limits was impossible. With a new process it is now possible to go far below the BAT limits. At Fiberboard GmbH in Baruth, Germany this process has been in continuous industrial operation since 2023.

Going far below the VOC-emission limits in the wood-panel industry

The wood-based panel industry comprises Medium density fibreboard (MDF), Oriented Strand Board (OSB) as well as Particleboard (PB). This industry produces some 50 Mio cubic meters of products per year.

As a raw material the main component being used are softwood, especially pine and spruce. Hardwoods can only be used to a limited extend due to technological reasons.

Pine trees contain resin that consists of rosin (colophonium) and a mixture of essential oils of terpenes, like alpha-pinene, beta-pinene, delta-3-carene, limonene and so on. These essential oils are present in the pine trees in a concentration of 3-5 kg/t dry matter. For an average MDF facility this accounts for 1200 – 2000 t/a. The terpenes are being released during the drying process and emitted to the air. Current state of the art bioscrubber systems are not able to remove these terpenes due to their inherent extremely low solubility in water.

OPERATIONAL

Achieved TRL 9+

Date of development of the technique

Start date 1 February 2020 End date 30 September 2023

Environmental purpose of the innovative technique

Reduction of emissions to air (including noise and odour)

Relevant industrial sector

Wood-based panels production

IED activity

6.1c Production in industrial installations of wood-based panels

- INCITE wird in Kürze MDF-T als **Emerging Technique** listen
- Damit automatisch state of the art und **Teilnahme am Sevilla Prozess**

Stand der Technik, TRL – Technology Readiness Level

- ✓ Handbuch der Rechtsformlichkeit des Bundesjustizministeriums: **Stand der Technik** definiert, wenn „Verfahren, Einrichtungen und Betriebsweisen sich **in der Praxis bewährt** haben ...“
- ✓ Horizont 2020: **Technologiereifegrad 9** (Technology Readiness Level, TRL) = „Qualifiziertes System mit **Nachweis des erfolgreichen Einsatzes in seiner Betriebsumgebung**; erfolgreiche Betriebserfahrungen“.

Kontinuierliche Abgasmessung

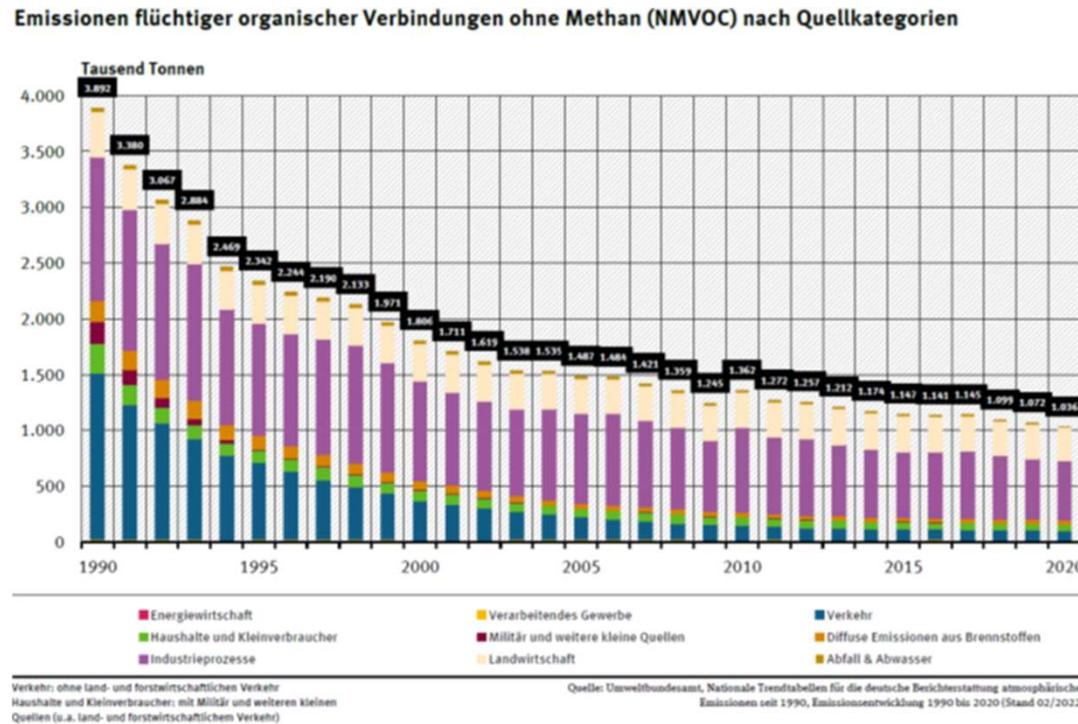


- ✓ Nasswäscher: vor Wäsche Sättigung (Quench), danach Absorption (Tropfkörper, Füllkörper)
- ✓ Wenn Vorreinigung unzureichend, würden Tropfkörper zuwachsen
- ✓ Abgasstrom daher systemimmanent immer ausreichend sauber für kontinuierliche Abgasmessung

Kontinuierliche Abgasmessung

- ✓ Bei FBB in Baruth ist kontinuierliche Abgasmessung seit 2007 erfolgreich im Einsatz. Daher:
- ✓ Kontinuierliche Abgasmessung für Trockner der MDF-Produktion eindeutig Stand der Technik bzw. TRL 9

VOCs in Deutschland



- Reduktion bei FBB um ca. 1.200 t/a entspricht 0,1% der gesamten deutschen VOC-Emissionen!
- Weitere Halbierung des Grenzwertes auf 60 mg/m³ ist problemlos möglich
- Das Terpentin bezahlt die Umweltrechnung!**

Zusammenfassung

- MDF-Terpentin Anlage: IBN Ende 2026
- MDF-T ist entwickelt und marktreif
- Lizenzvergabe ist angelaufen
- Das Terpentin bezahlt die Umweltrechnung

Contact

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Further information

Presentations:

PCA meeting **Dublin** 2023

https://prof.bht-berlin.de/fileadmin/labor/mvt/SHK/PCA_Bungert_MDF-T_2023-09-19.pdf

European Panel Federation **Brussels** 2024

https://prof.bht-berlin.de/fileadmin/labor/mvt/SHK/EPFIED_working_group_Brussels_R01.pdf

Surfaces Eurasia **Istanbul** 2024

https://prof.bht-berlin.de/fileadmin/labor/mvt/SHK/Surfaces_Eurasia_2024-11-27_28_R01.pdf

PCA meeting **San Diego**

https://prof.bht-berlin.de/fileadmin/labor/mvt/SHK/PCA_meeting_San_Diego_Bungert_MDF-Turpentine_R01.pdf

Data sheets:

Product data sheet

https://prof.bht-berlin.de/fileadmin/labor/mvt/MDF-Terpentin/Classen_MDF-Turpentine_PDS_R04.pdf

Material Safety Data Sheet (German)

https://prof.bht-berlin.de/fileadmin/labor/mvt/MDF-Terpentin/sd17514 - MDF-Terpentin_DE_DE.pdf

Material Safety Data Sheet (Englisch)

https://prof.bht-berlin.de/fileadmin/labor/mvt/MDF-Terpentin/sd17514 - MDF_Turpentine_EU_EN.pdf

Material Safety Data Sheet (French)

https://prof.bht-berlin.de/fileadmin/labor/mvt/MDF-Terpentin/sd17514 - Terebenthine_MDF_FR_FR.pdf