Proposal for Negotiations on the Creation of a Carbon Credit Financial Instrument

dMRV-Powered Forest Carbon

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To: RMK (Riigimetsa Majandamise Keskus), Tallinn, Estonia

From: Urstamm AG, Switzerland (CHE-488.875.330)

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Urstamm AG: Swiss Precision in Digital Forest Monitoring & Sustainability

Urstamm AG is a Swiss technology and sustainability company based in Urnäsch (Appenzell Ausserrhoden). The company focuses on creating transparent, digital timber supply chains and developing high-integrity forest climate projects. By combining forestry expertise, digital technology, and climate science, Urstamm enables a traceable, data-driven, and sustainable use of forest resources.

At the core of Urstamm's approach is a **digital timber supply chain platform** that tracks wood from the individual tree in the forest through every processing stage to the final wooden product. Using a dedicated application and blockchain technology, all process steps are recorded in a tamper-proof and transparent way. This allows the origin and transformation of timber to be fully traceable, whether at the level of a specific tree, a harvesting site, or a defined harvesting period.

In addition, Urstamm develops **forest-based carbon removal projects** based on the principles of *Improved Forest Management (IFM)* in sustainably managed forests. These projects generate high-quality carbon removal certificates. Unlike many conventional approaches that rely on hypothetical growth models, Urstamm measures actual carbon sequestration using real forest data. Advanced remote sensing technologies, including satellite and LiDAR measurements, combined with digital Monitoring, Reporting and Verification (dMRV), enable precise quantification of additional CO_2 stored in forest biomass.

The projects are structured in accordance with international standards such as ISO 14064-2 and registered in the recognized carbon registry of International Carbon Registry (ICR). For companies pursuing climate targets or sustainability ratings—such as B Corp, SBTi, or EcoVadis—Urstamm provides with the ICROA certified projects detailed digital impact documentation that demonstrates methodological integrity, transparency, and measurable environmental impact.

Another important focus is the **promotion of biodiversity in Swiss forests**. Urstamm applies advanced environmental DNA (eDNA) analysis from soil and water samples to monitor biodiversity and support targeted ecological improvements within forest ecosystems.

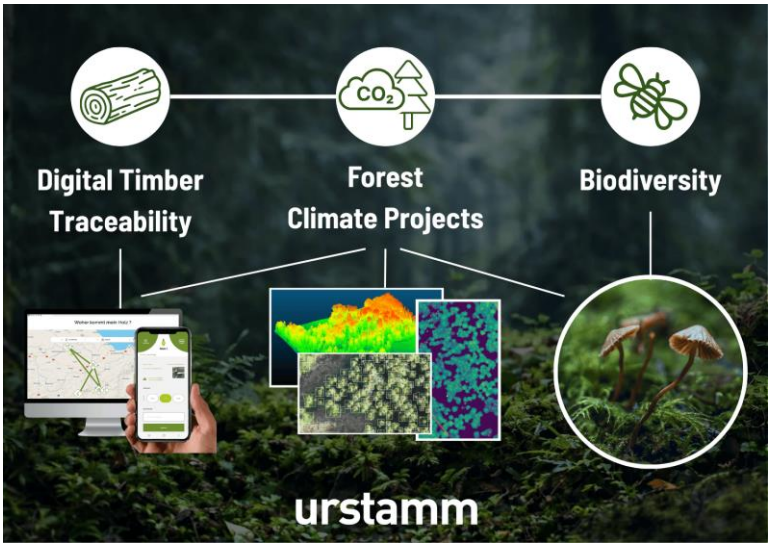

Figure 1: The three pillars of Urstamm

By integrating forestry knowledge, digital infrastructure, and scientifically robust climate impact measurement, Urstamm positions itself as an innovative partner for forest owners, the timber industry, construction companies, and organizations seeking credible, locally anchored climate solutions. The company's mission is to connect sustainable forest management, transparent material flows, and measurable climate impact—creating long-term ecological and economic value for the forest sector.

1. Executive Summary

This proposal outlines a strategic collaboration between Riigimetsa Majandamise Keskus (RMK) and Urstamm AG to develop a high-integrity forest carbon program based on digital Monitoring, Reporting and Verification (dMRV). The initiative directly supports RMK's 2024–2028 strategy to maximise carbon sequestration, strengthen applied research and develop data-driven forest management.

Urstamm proposes the creation of a **tree-centric Digital Twin,** in the first place **for a 20,000-hectare pilot forest area** in Estonia. Using high-resolution LiDAR, remote sensing and AI-based modelling, the system measures carbon storage at the level of individual trees. This approach moves beyond conventional carbon accounting based on statistical averages and **enables precise and verifiable quantification of CO_2 sequestration**, forming the basis for high-integrity carbon removal credits aligned with **ISO 14064-2, ICROA** and international carbon registries.

Before full project implementation, several **strategic, regulatory and methodological questions** must be clarified. These include alignment with Estonia's national carbon accounting under the EU LULUCF framework and the Paris Agreement, the definition of additional carbon sequestration beyond RMK's existing management strategy, scientific calibration of biomass models for Estonian forest conditions, and the integration of RMK's FORS forestry information system into a digital MRV infrastructure. In addition, the project must assess the carbon potential of **Harvested Wood Products (HWP)** and peatland restoration.

To address these uncertainties and ensure methodological robustness, Urstamm proposes a **phased project approach managed according to the HERMES project management standard**. As a first step, this proposal includes a **binding offer only for the Initialisation Phase (4–6 months)**. During this phase, Urstamm will conduct regulatory and legal assessments, audit RMK's forest inventory data, perform a technical site campaign including LiDAR calibration, evaluate carbon potentials, and develop the first draft of a project-specific dMRV methodology. The outcome will be a comprehensive Initialisation Report forming the basis for RMK's decision on the next project phases and potential national scaling.

The Initialisation Phase is estimated at **67–100 person-days** with a daily rate of **€1'600**, resulting in an expected project cost of **€107'200 – €160'000**, with a budget cap of **€140'000 (net)** excluding travel expenses and accommodation.

Through this collaboration, RMK has the opportunity to position Estonia's state forests as a **European benchmark for high-integrity forest carbon projects**. By combining Swiss precision in digital forest monitoring with RMK's extensive forest resources, the project creates a scientifically robust and internationally credible foundation for future carbon assets.

2. Outstanding issues regarding project implementation

During the comprehensive evaluation and preparation of this proposal, we identified several critical regulatory, methodological, and technical variables that require precise alignment before the project moves into full-scale implementation. Addressing these points is essential to ensure the long-term integrity, bankability, and compliance of the carbon credits generated within the RMK framework.

The following sections outline the core uncertainties regarding international carbon accounting standards, site-specific scientific calibration, and operational data integration. To mitigate these risks effectively, we have designed a **phased project approach** (detailed in Chapter 4). This structure allows for a rigorous "Discovery and Calibration" phase to resolve these outstanding items, thereby creating a robust foundation for a high-integrity Digital Twin and a seamless certification process.

2.1 Strategic & Regulatory Uncertainties (Compliance)

LULUCF Integration & Double Counting:

- **Status Quo:** The RMK is part of Estonia's national carbon account.
- **Uncertainty:** How is it ensured that the 'removals' generated by RMK are not simultaneously counted towards Estonia's national inventory for the achievement of the EU LULUCF targets? In order for the credits to be traded on the international market as "high-integrity," corresponding adjustments in accordance with Article 6 of the Paris Agreement need to be clarified.

Definition of 'additionality':

- **Status quo:** The RMK Strategy 2024–2028 already provides for 'maximising carbon sequestration'.
- **Uncertainty:** We must define precisely, both legally and methodologically, which measures go beyond the RMK's statutory and strategic "business-as-usual". Only this surplus can be monetised as a credit (additionality).

2.2 Methodological and scientific uncertainties (dMRV basis)

Localisation of allometry for Estonia:

- **Current situation:** The RMK has so far used average values for soil and biomass stocks (based on national coefficients).
- **Uncertainty:** Our tree-centric dMRV method must be calibrated to the specific Estonian site conditions. The Technical Site Visit must clarify the strength of the correlation between crown volume (LiDAR measurement) and actual biomass for Estonian stands of pine, spruce, birch, etc.

Peatland dynamics (peatland emissions):

- **Current situation:** The RMK 2022 report identifies methane (CH_4) and nitrous oxide (N_2O) from organic soils as significant emission sources.
- **Uncertainty:** We need to clarify whether the pilot sites contain drained peatlands and how we can use dMRV technology to make the reduction of these gases through rewetting measurable. According to the report, the RMK's calculations to date are still very rough in this regard.

2.3 Technical & Operational Uncertainties

Interface Audit (FORS System):

- **Current Situation:** RMK uses the FORS forestry information system.
- **Uncertainty:** In what format is for example the historical growth data, stock data or usage figures available? In Phase 1, we must examine how we can automatically feed this data into our 'Digital Twin' to ensure a seamless chain of custody for the auditor.

Harvested Wood Products (HWP) – Material Utilisation:

- **Current Situation:** RMK harvests approx. 3.6 million m^3 of timber per year.
- **Uncertainty:** What is the proportion of long-lasting wood products (e.g. construction timber) that sequester carbon over decades? In Phase 1, we must assess supply chain transparency in order to be able to account for this sequestration as a "harvested wood product" in accordance with ISO 14064-2.

3. Technical Superiority: Precision Beyond Standard Reporting

While traditional projects rely on low-resolution satellite imagery (10–30m), Urstamm employs a Tree-Centric dMRV approach, ensuring that every individual tree is accounted for as a distinct carbon reservoir. Your recent **RMK Carbon Reports (2021 & 2022)** demonstrate a sophisticated understanding of carbon fluxes (CO_2, CH_4, and N_2O). However, as noted in your reports, current calculations rely on soil and biomass stock estimates derived from traditional inventory data. Urstamm elevates this by moving from "Calculated Estimates" to "Direct Measurements."

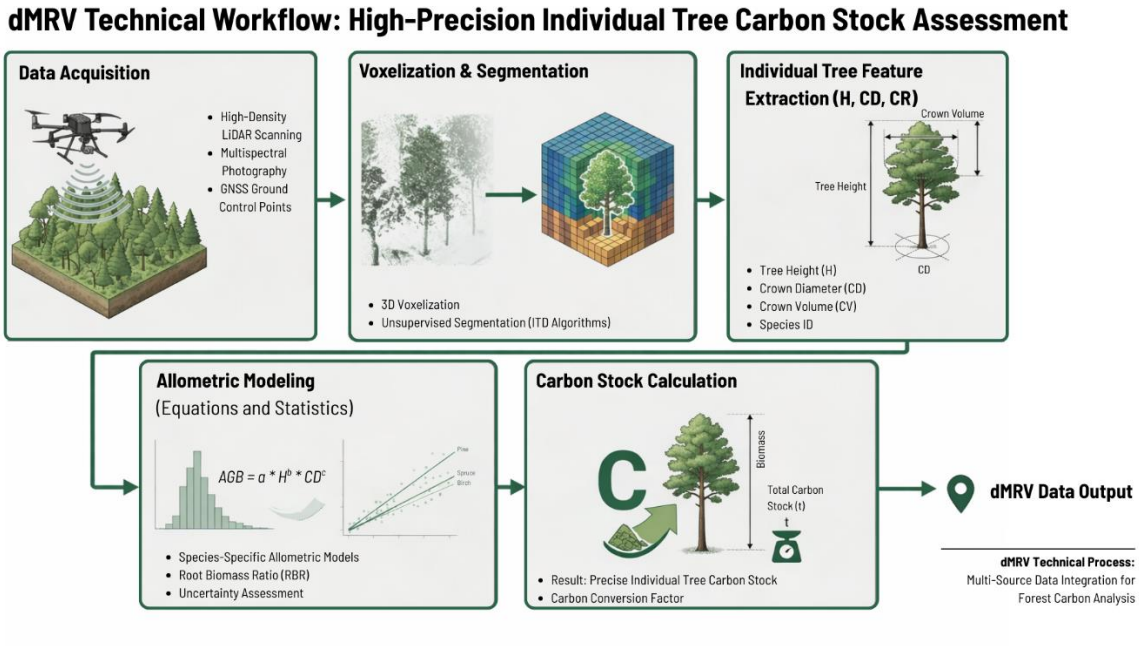

Figure 2: Technical Workflow (own illustration)

3.1 Ultra-High-Density LiDAR Data Acquisition

While standard reports use average age-class data, Urstamm employs a **Tree-Centric dMRV** approach:

- **High-Density Data:** Using DJI M350 RTK with Zenmuse L2/L3 payloads, we generate >300 pts/m^2, allowing for a vertical accuracy of ±10 cm. Other systems/providers (e.g. Riegl) are an option and will be evaluated during the initialisation phase (see Chapter 4) as required.
- **Crown Architecture:** Our technology extracts specific crown volumes. Given RMK's diverse site conditions (as cited in your carbon stock literature), this precision is essential to differentiate between species-specific carbon densities, such as Scots Pine vs. Norway Spruce.
- **Peatland Precision:** RMK's 2022 report highlights the importance of CH_4 and N_2O emissions from organic soils, although CO_2 typically remains the dominant component. Our LiDAR-derived DTMs, with sub-decimetre resolution, provide a robust basis for analysing microtopography and hydrological controls, which are essential for assessing drainage patterns and restoration potential in these areas.

3.2 AI-Driven Segmentation & Allometric Modeling

Our proprietary algorithms segment individual trees from the point cloud. In combination with multispectral data (Sentinel-2 or Drone Data), we perform automated species identification. This is vital because a Norway Spruce (Picea abies) and a Silver Birch (Betula pendula) possess different carbon densities. We calibrate species-specific allometric equations tailored to Estonian tree and growth conditions.

4. Projekt Implementation via HERMES Methodology

To ensure maximum transparency and institutional control, Urstamm manages this project according to the HERMES standard. This structure provides RMK with clear "Quality Gates" and "Stop-or-Go" decision points (♦).

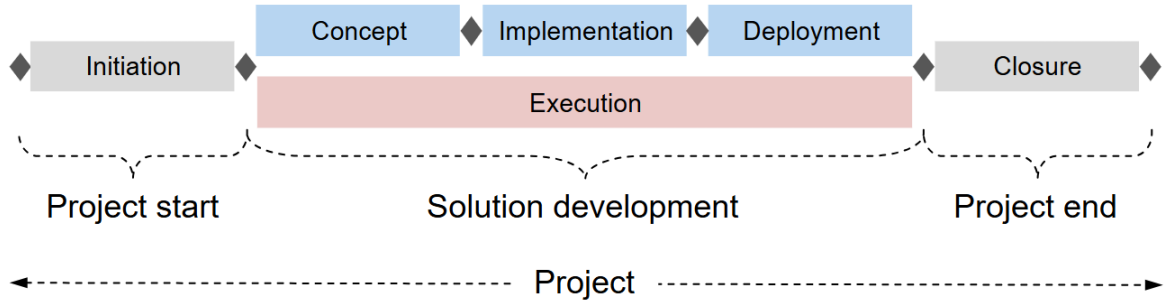

Figure 3: HERMES project life cycle

4.1 The Master Plan: Pilot-to-National Scaling

Urstamm would structure and organise the project as follows:

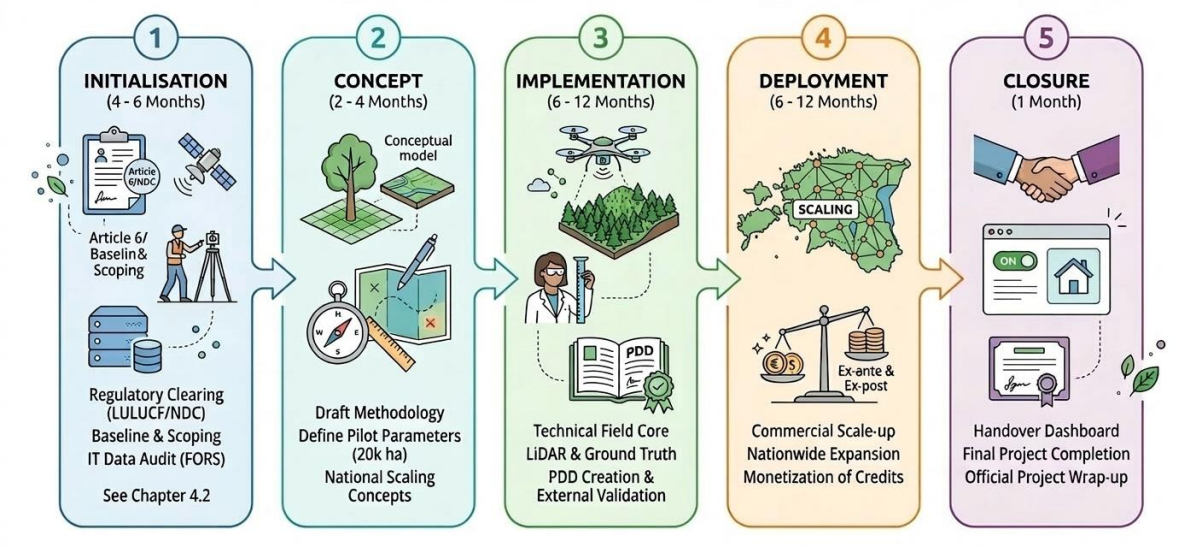

Figure 4: Strategic Project Roadmap

Phase 1: Initialisation – Strategic Foundation & Methodological Scoping (4-6 Months)

The objective of this phase is to establish a high-integrity legal and technical baseline. We conduct a "Regulatory Clearing" to ensure full compliance with Article 6 of the Paris Agreement and Estonia's LULUCF reporting, preventing any risk of double counting. Simultaneously, we perform a technical audit of the existing FORS data and a field site visit to calibrate our sensors for the specific Estonian forest conditions. A key component is also the evaluation of the methodology through a Pre-Draft, focusing on Improved Forest Management (IFM), Peatland/Moore restoration, and other relevant frameworks to ensure the project's alignment with international standards. (See Chapter 4.2 for a detailed breakdown).

Phase 2: Concept – Methodology Draft & Scaling Blueprint (2-4 Months)

In this phase, we develop the initial draft of the tree-centric dMRV methodology tailored to the RMK forest portfolio. We define the precise parameters and boundaries for the 20,000-hectare pilot project. A key deliverable is the conceptual framework for nationwide scaling, ensuring that the technology and data architecture developed in the pilot are ready for industrial expansion.

Phase 3: Execution – Pilot Implementation & Validation (6-12 Months)

This is the core technical phase where the digital twin of the 20,000-hectare area is created.

- **Realisation:** Deployment of Remote Sensing and rigorous Ground Truthing (95% CI) to ensure highest data precision.
- **Documentation:** Finalization of the project-specific methodology and the **Project Design Document (PDD)**.
- **Audit:** Initiation of the external validation process by an independent third party (VVB) to guarantee that the resulting credits meet international "Investment Grade" standards (for PDD and possibly for methodology).

Phase 4: Deployment – National Scaling & Monetization (6-12 Months)

Upon successful validation of the pilot, the project scales to the entire national forest territory managed (managed forest area, excluding nature reserves) by RMK. This phase focuses on the continuous monitoring of carbon sequestration and the commercialization of the assets. We facilitate the sale of both **ex-ante removal credits** (projected sequestration) and **ex-post removal credits** (verified sequestration), integrating Harvested Wood Products (HWP) and peatland to maximize the total carbon benefit.

Phase 5: Closure – Handover & Project Wrap-up (1 Month)

The final phase ensures a seamless transition to the RMK operations team. We provide the finalized Monitoring Dashboard, which allows for automated yearly reporting of incremental growth. The phase concludes with the official project handover and a formal wrap-up of all administrative and technical workflows.

Since fundamental aspects of the overall project—such as the eligibility of the RMK forest's CO_2 performance for inclusion in the VCM versus its inclusion in Estonia's climate accounting under the Kyoto Protocol, opportunities for HWP, etc.—must first be clarified (see Chapter 2). This proposal only includes a binding offer for the initialisation phase (Chapter 4.2).

The subsequent phases will be worked out in detail during the initialisation phase.

4.2 Phase 1: Initialisation (Strategic Foundation)

Duration: 4–6 Months | **Effort:** 67 – 100 Person-Days (PD)

Module	Activity	Effort (PD)
1. Project Setup	Kick-off, Governance structure, Stakeholder mapping, and Project Management Plan.	2-3
2. Legal & Compliance Audit	NDC/LULUCF alignment, preventing Double Counting, and Legal Opinion on Credit Ownership.	10-12
3. Baseline & Inventor Analysis	Deep audit of RMK's FORS data; statistical modeling of the Business-As-Usual (BAU) scenario.	10-15
4. Technical Site Visit in pilot area	**The Core:** LiDAR calibration and evaluation, test flights, Ground-Truthing, and IT-interface audit with RMK systems.	20-30
5. HWP & Peatland Scoping	Assessment of long-term storage in Harvested Wood Products (HWP) and peatland restoration potential.	10-15
6. Methodological Design	Development of the project-specific dMRV methodology pre-draft (Localisation of ICR/ISO/ICROA standards).	10-15
7. Final Initialisation Report	Final report on the initialisation phase for the RMK Board of Directors. Basis for decision-making regarding Phase 2 and 3: "Concept" and "Implementation"	5-10

5. Methodological Integrity: ISO 14064-2 & ICR Validation

Urstamm operates under the most rigorous international standards. Our approach is strictly aligned with **ISO 14064-2:2019** and **ICROA**, providing the legal and scientific certainty required for high-value carbon markets.

Following an intensive validation phase, **Urstamm has been successfully validated under ICR since early 2026.** As part of our **ICR Grouped Project (ID 315)**, we conduct annual cohorts to integrate new forest areas into the certified inventory. This scalable structure allows for continuous growth; following the successful start, additional forest areas are scheduled to join the Grouped Project within this year and throughout the coming years, steadily increasing the volume of high-integrity credits.

- **95% Confidence Interval:** We move beyond estimates. Our dMRV data achieves a statistical certainty that far exceeds traditional manual inventories.
- **Empirical Ground Truthing:** We utilize permanent sample plots to validate AI models, ensuring the "Digital Twin" matches the "Physical Forest."
- **Conservativeness Principle:** In instances of data uncertainty, we apply the principle of conservativeness to protect the reputational integrity of the RMK credits.

6. The Urstamm Expert Team: High-Level Governance

We provide a senior team of specialists to ensure the project meets the highest global standards:

- **Toni Caradonna (Lead Technology):** Physicist specializing in CO_2 dynamics and blockchain-based transparency. He has the lead for dMRV data integrity.
- **Yasmine Afifi (Lead Science & Operations):** Biologist responsible for ecological quality assurance. She ensures that biodiversity factors and ecosystem resilience are an integral part of the monitoring process, bridging the gap between field data and scientific standards.
- **Pascal Inauen (Management & Project Lead):** Economist and expert in the economic scaling of nature-based solutions (NbS). He oversees the strategic alignment of the project to ensure it meets RMK's commercial and environmental objectives.

- **Specialist Pool:** Senior LiDAR Engineers, Forest Scientists, and Remote Sensing Analysts.

7. Economic Proposal & Resource Allocation

Our pricing reflects the high-specialized nature of Carbon Finance, forestry expertise, technological innovation and state of the art dMRV engineering, ensuring a "First-Time-Right" delivery to avoid costly validation delays.

- **Daily Rate: 1,600 €** (Net)
- **Phase 1: 107'200 € – 160'000 €**
    - **Budget Cap/Maximum cost: 140'000 €** (Excluding VAT and travel expenses).
    - Invoices will be issued based on the actual number of hours worked per month.
- **Estimated Travel & Expenses: 8,800 €** (Net) for the intensive 3-week Site Visit.

Value Proposition: This investment mitigates the risk of "Greenwashing" allegations. By establishing a robust methodological fortress during Initialisation, RMK avoids the devaluation of its carbon assets.

8. Strategic Conclusion: Why Urstamm?

Through this collaboration, RMK gains the opportunity to position Estonia's state forests as a **European benchmark for high-integrity forest carbon projects**. Urstamm contributes:

- **Technological leadership** through tree-centric dMRV and ultra-high-density LiDAR data
- **Methodological integrity** based on ISO 14064-2 and internationally recognized carbon standards
- **Investment-grade transparency** through digital monitoring and verifiable carbon accounting
- **Institutional project governance** via the HERMES framework

By establishing a scientifically robust and regulatorily compliant foundation during the initialisation phase, RMK can significantly reduce risks related to carbon credit validation, reputational exposure, and potential greenwashing allegations.

The initialisation phase therefore represents a **low-risk strategic entry point** for transforming RMK's forest assets into a scalable and internationally credible carbon removal program.

We are ready to initiate the digital transformation of Estonia's forest assets. Our team is available for a **Kick-off in April 2026**.

Urnäsch, 18.03.2026

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