

CO₂ CONCENTRATION IN THE ATMOSPHERE SINCE 1958



1. What is the problem ?

- **Problem:** Uncertainty about whether human emissions are truly accumulating in the global atmosphere.
- **Technology:** Non-dispersive infrared (NDIR) monitoring system providing continuous CO₂ measurements at a site far from local pollution sources (~3.397m).
- **Pros:**
 - Provides indisputable empirical evidence ($R^2 = 0.9751$)
 - Ideal location for collecting globally representative “clean air” data
- **Cons:**
 - Measures only concentrations (effects), not emission sources (causes)
 - High operational costs for remote station



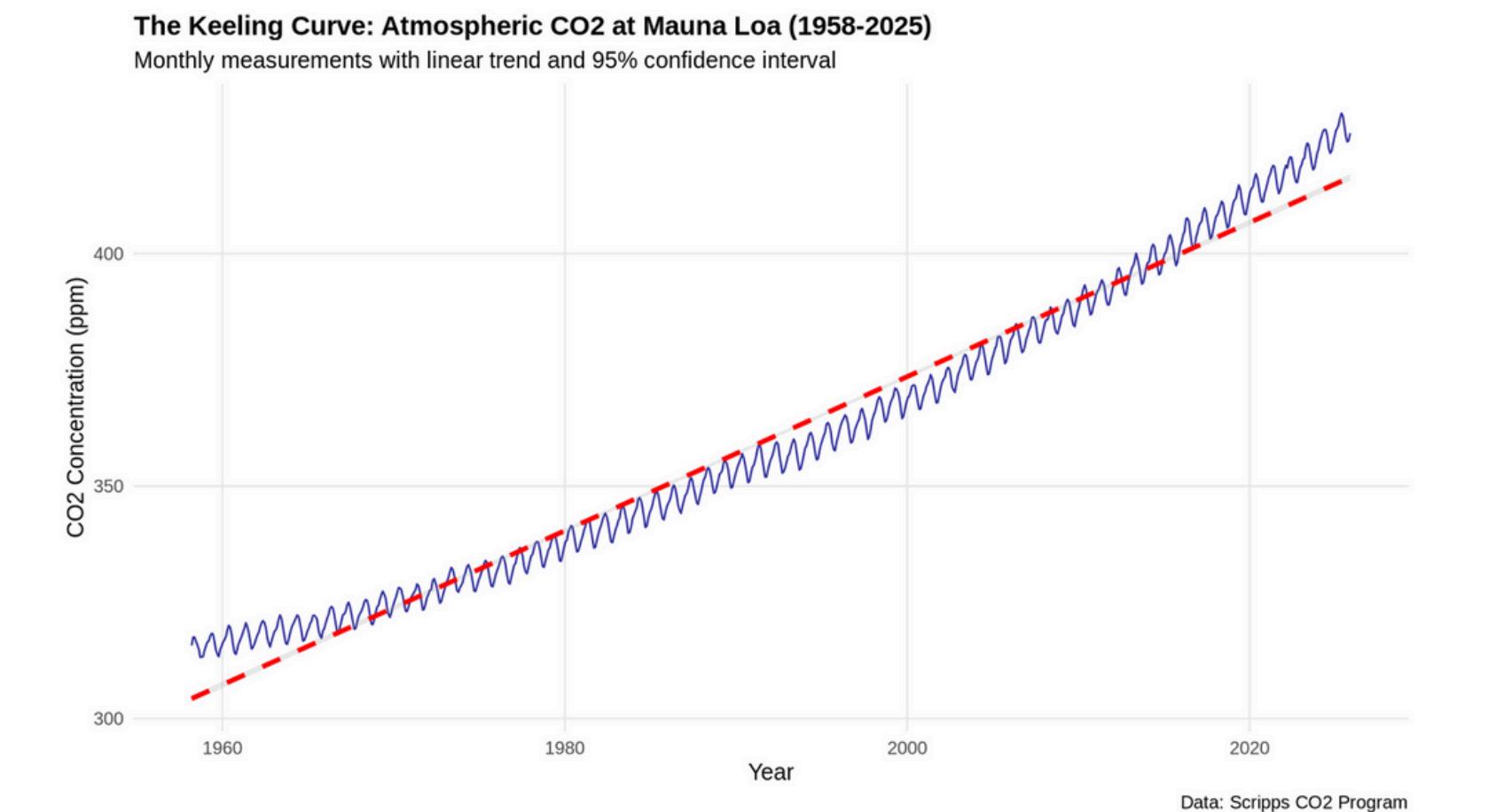
2. Effectiveness in Solving the Problem

- **Empirical Evidence:**

- Increase from 315.71 ppm (1958) to 425.92 ppm (2025)
- Total growth: +34.9%

- **Statistical Reliability:**

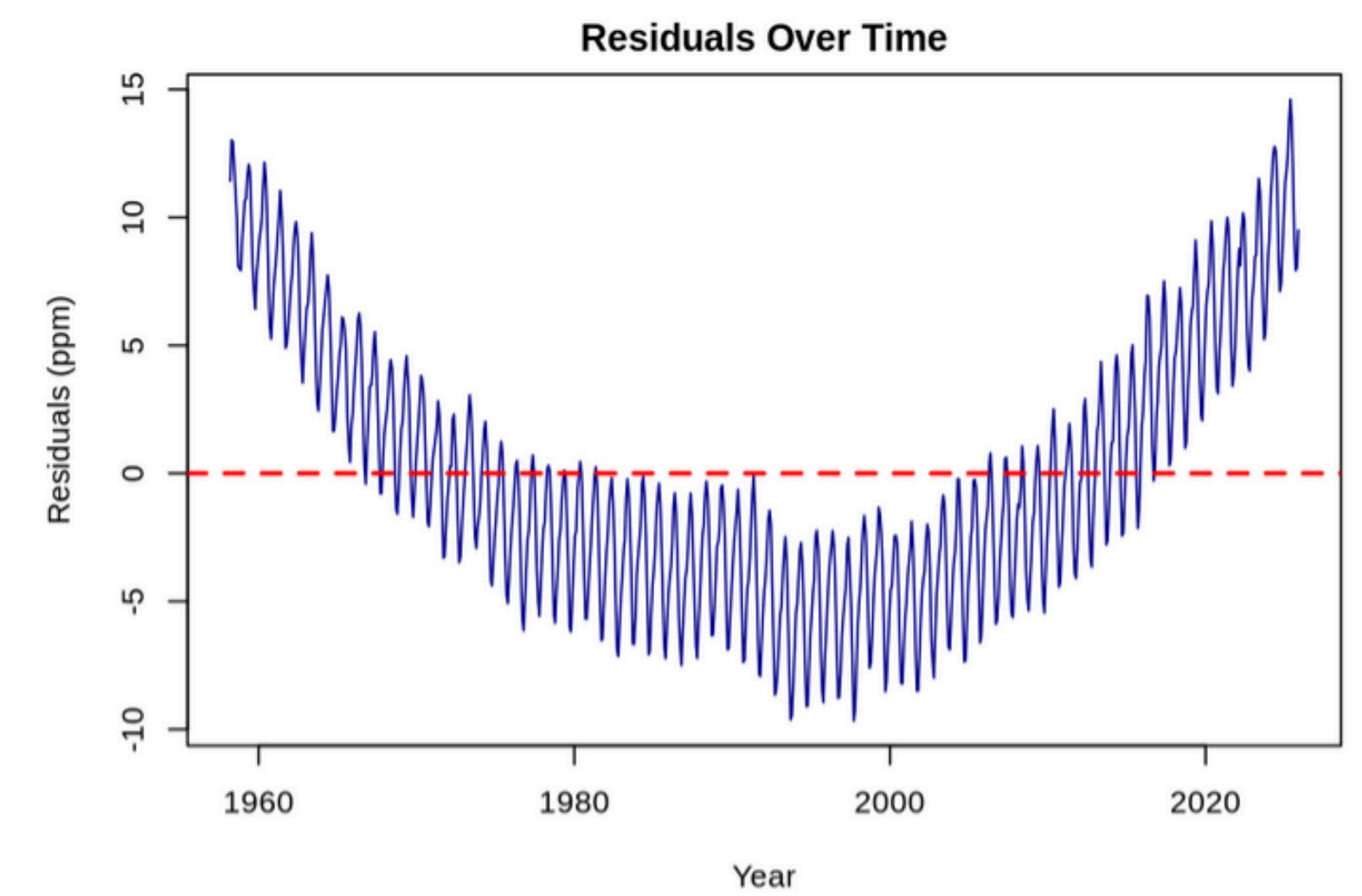
- $R^2 = 0.9751$: Linear trend explains 97.5% of data variation





3. New Applications & Emerging Issues

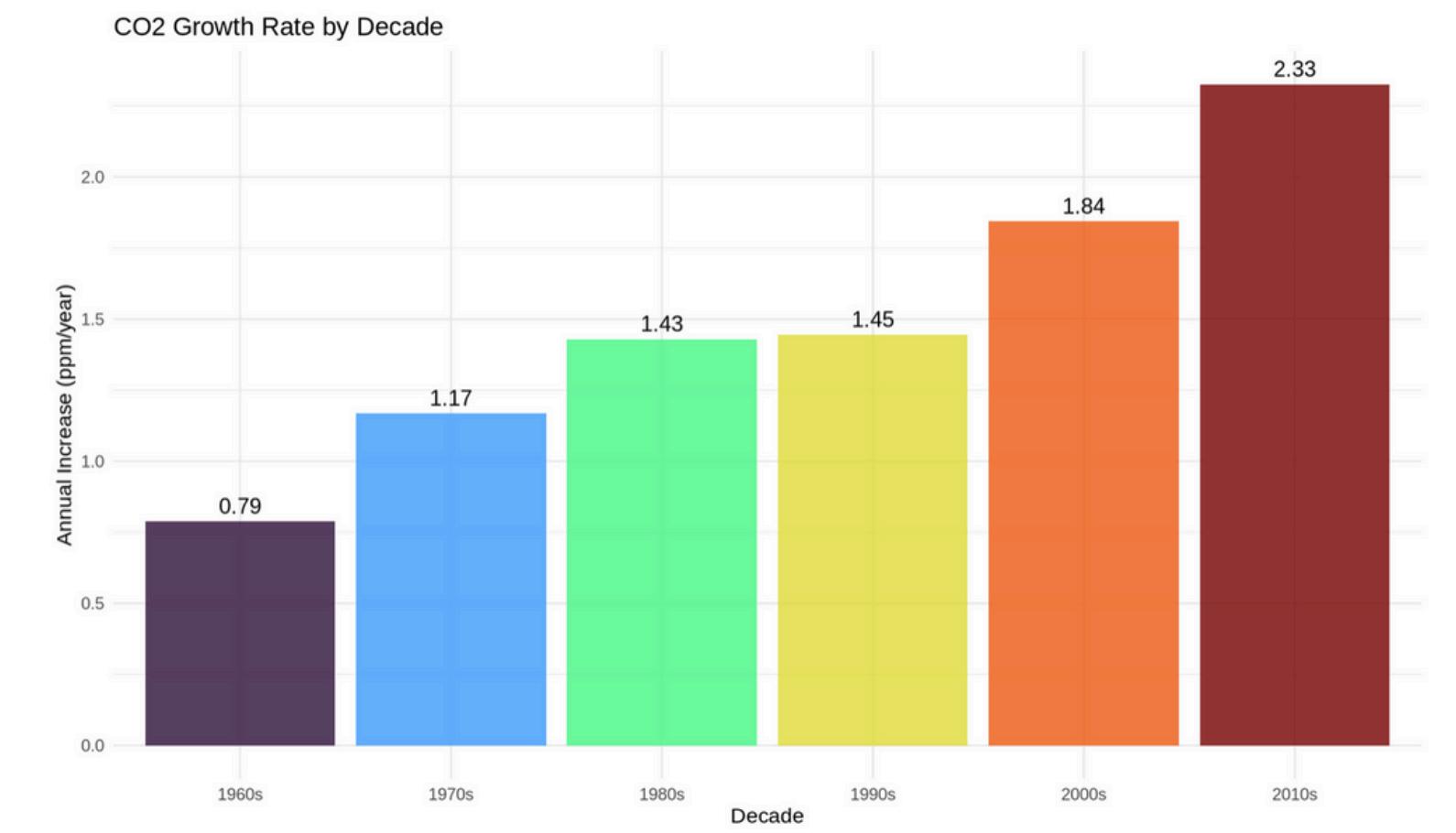
- **New Applications:** Foundation for global climate models and international agreements (Paris Agreement)
- **Emerging Issue – Acceleration:**
 - Residuals Over Time chart shows U-shape
 - Indicates CO₂ is rising faster than predicted by simple linear models
- **Challenge:** Existing policies may underestimate actual accumulation rates





4. Alignment with ADEME 2050 Scenarios

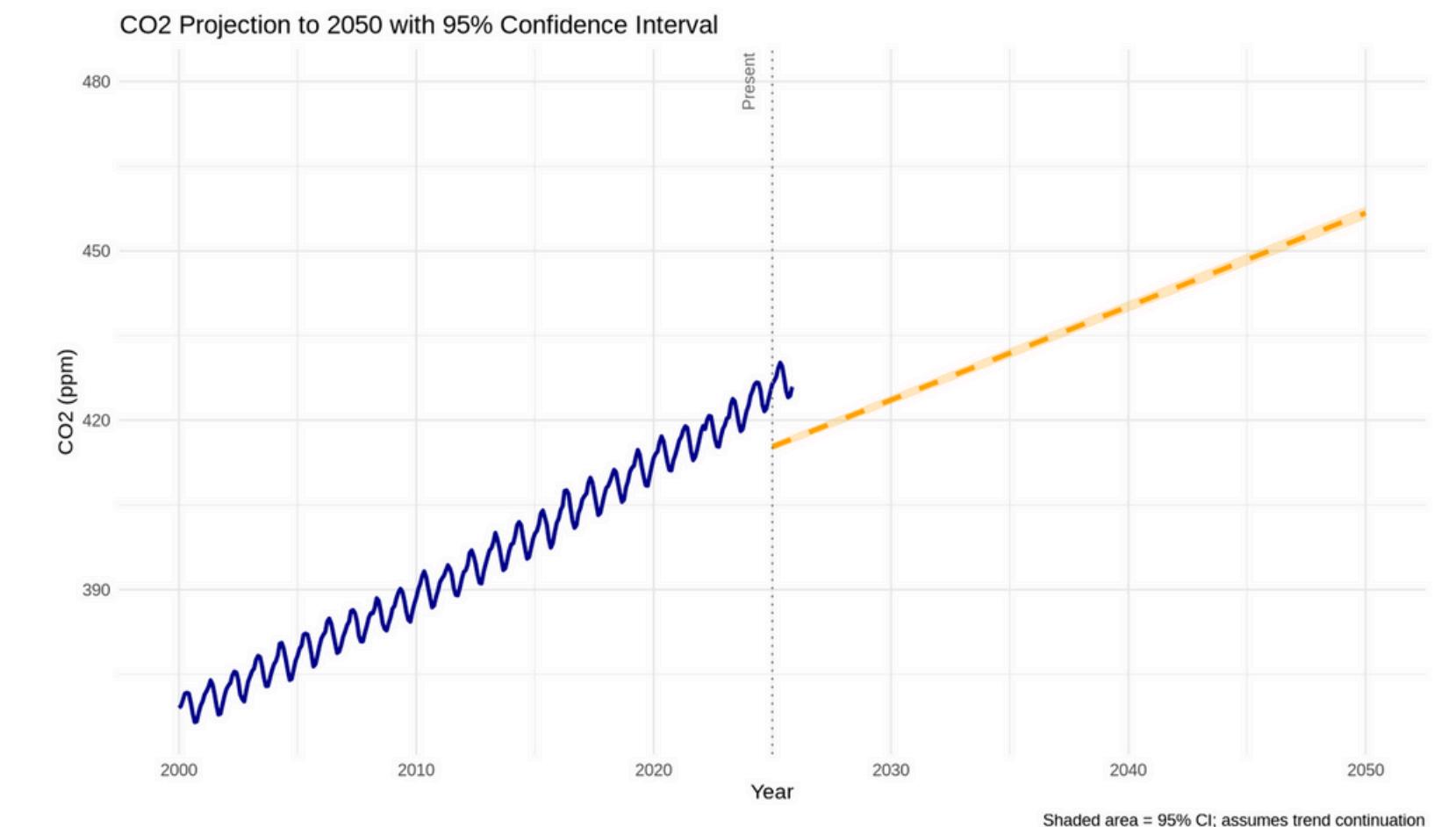
- **Compatibility:** Key tool for ADEME Scenario 3 (Regional Cooperation) and Scenario 4 (Restoration)
- **Role:** Monitor and verify the effectiveness of emission reduction policies and carbon capture technologies
- **Current Status:** Recent decade's growth rate (2.33 ppm/year) indicates a significant gap from sustainable targets





5. Conclusion & Future Projections

- **Projection to 2050:** Estimated 456.7 ppm [95% CI: 455.6–457.9]
- **Key Message:**
 - Human impact has overwhelmed Earth's natural cycles
 - Monitoring data is essential for informed energy transition decisions



**THANK
YOU**