

# CO<sub>2</sub> 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 CO<sub>2</sub> 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



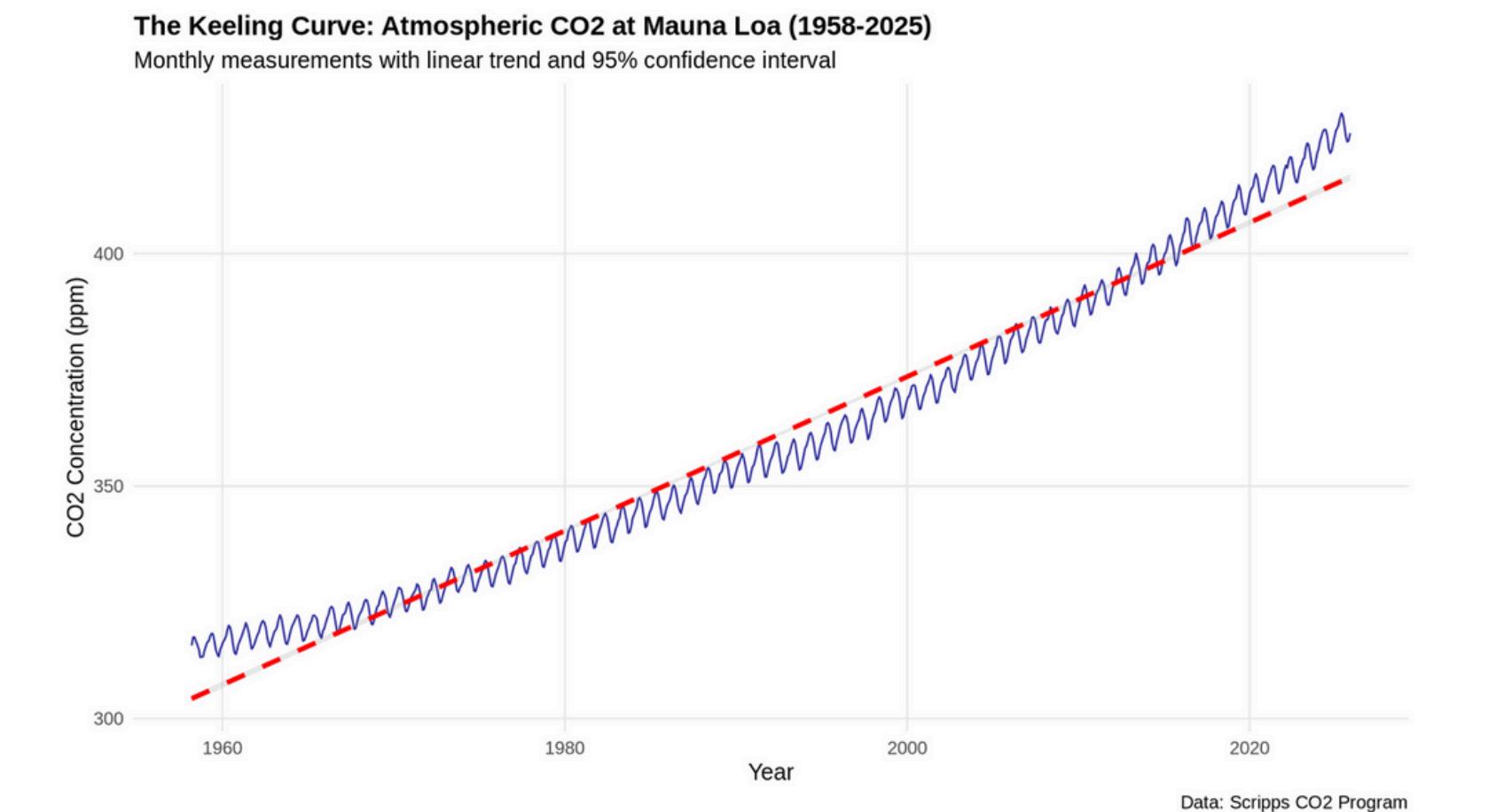
## 2. Effectiveness in Solving the Problem

- **Empirical Evidence:**

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

- **Statistical Reliability:**

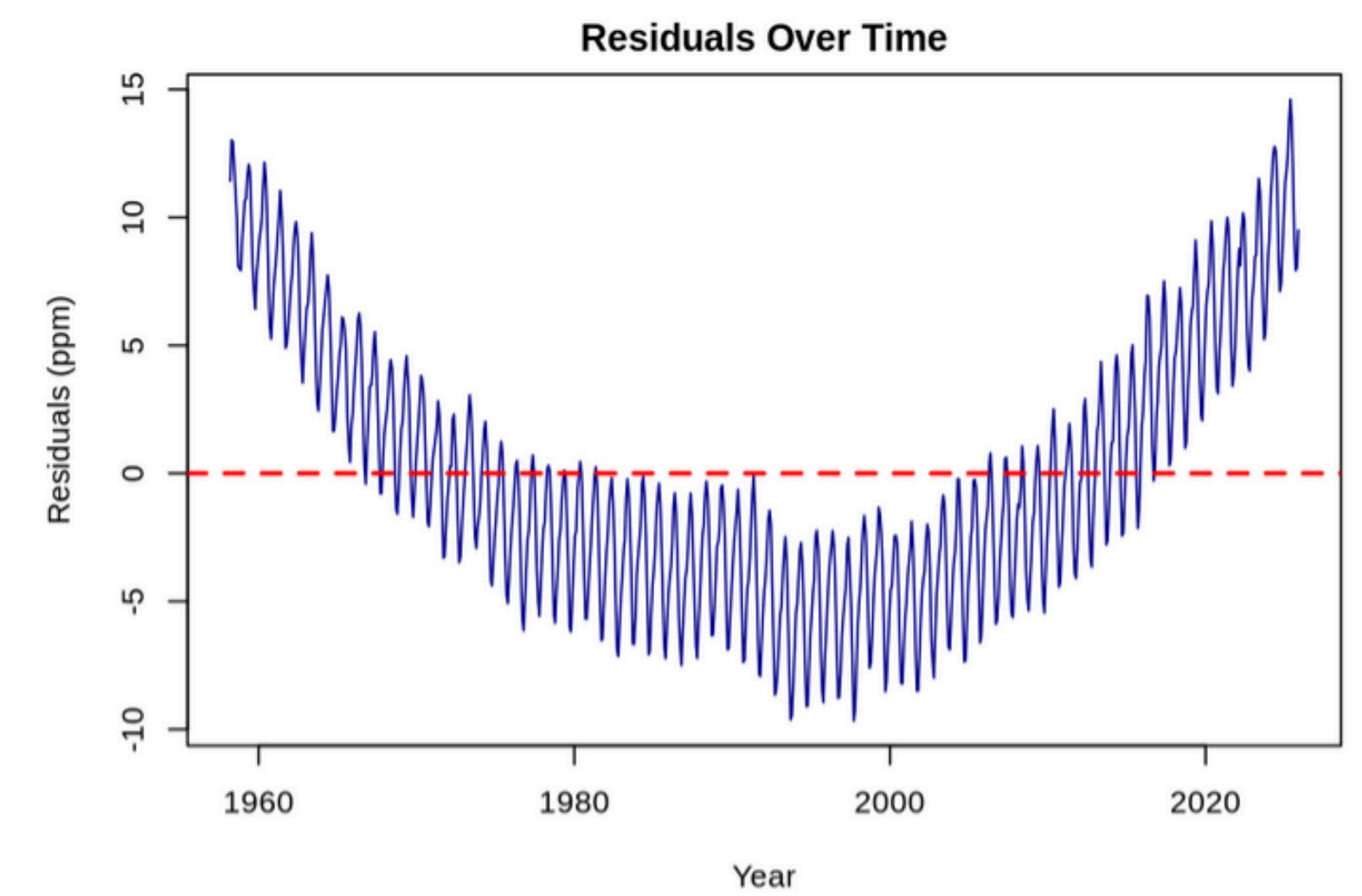
- $R^2 = 0.9751$ : Linear trend explains 97.5% of data variation





# 3. New Applications & Emerging Issues

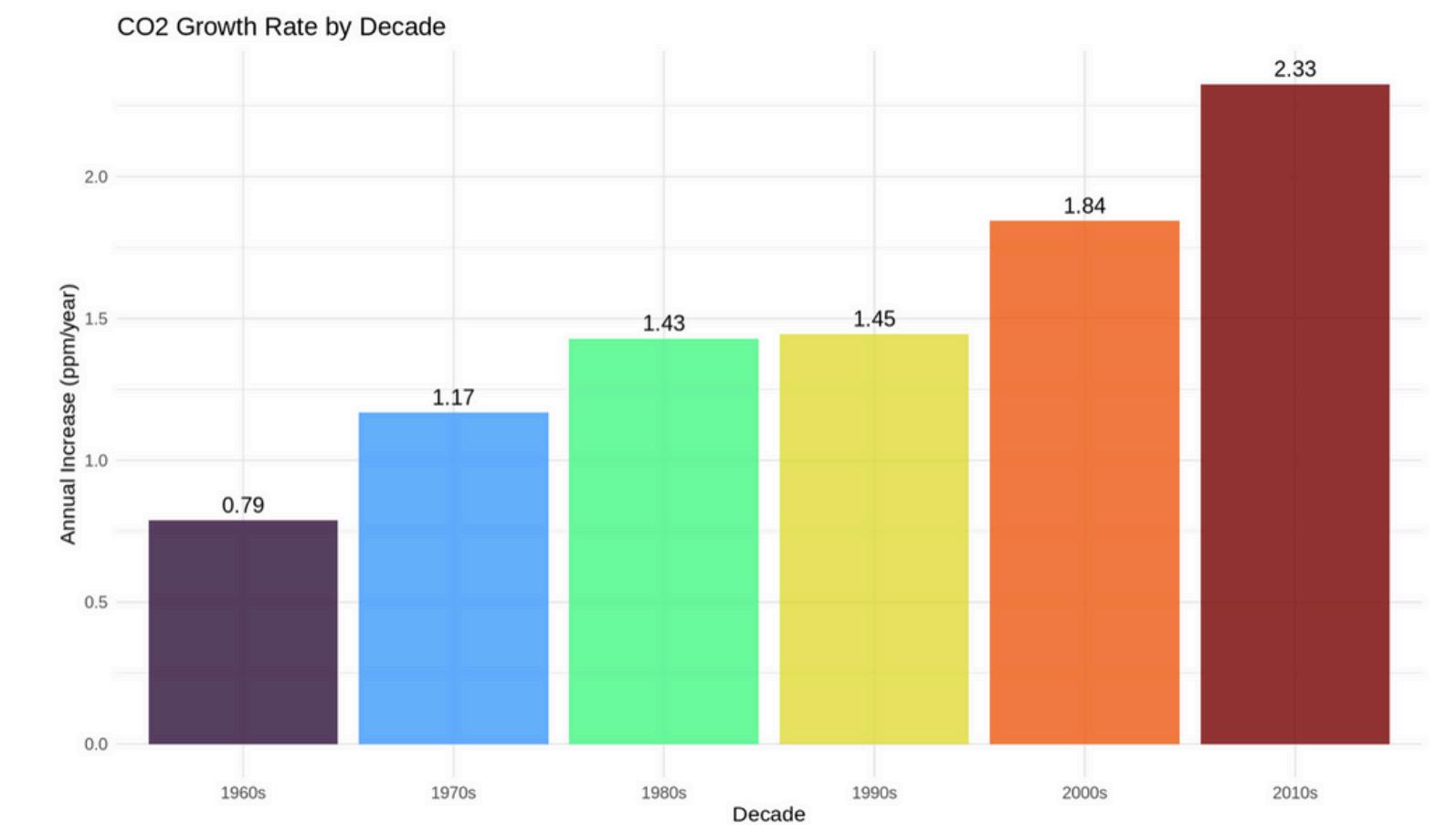
- **New Applications:** Foundation for global climate models and international agreements (Paris Agreement)
- **Emerging Issue – Acceleration:**
  - Residuals Over Time chart shows U-shape
  - Indicates CO<sub>2</sub> is rising faster than predicted by simple linear models
- **Challenge:** Existing policies may underestimate actual accumulation rates





# 4. Alignment with ADEME 2050 Scenarios

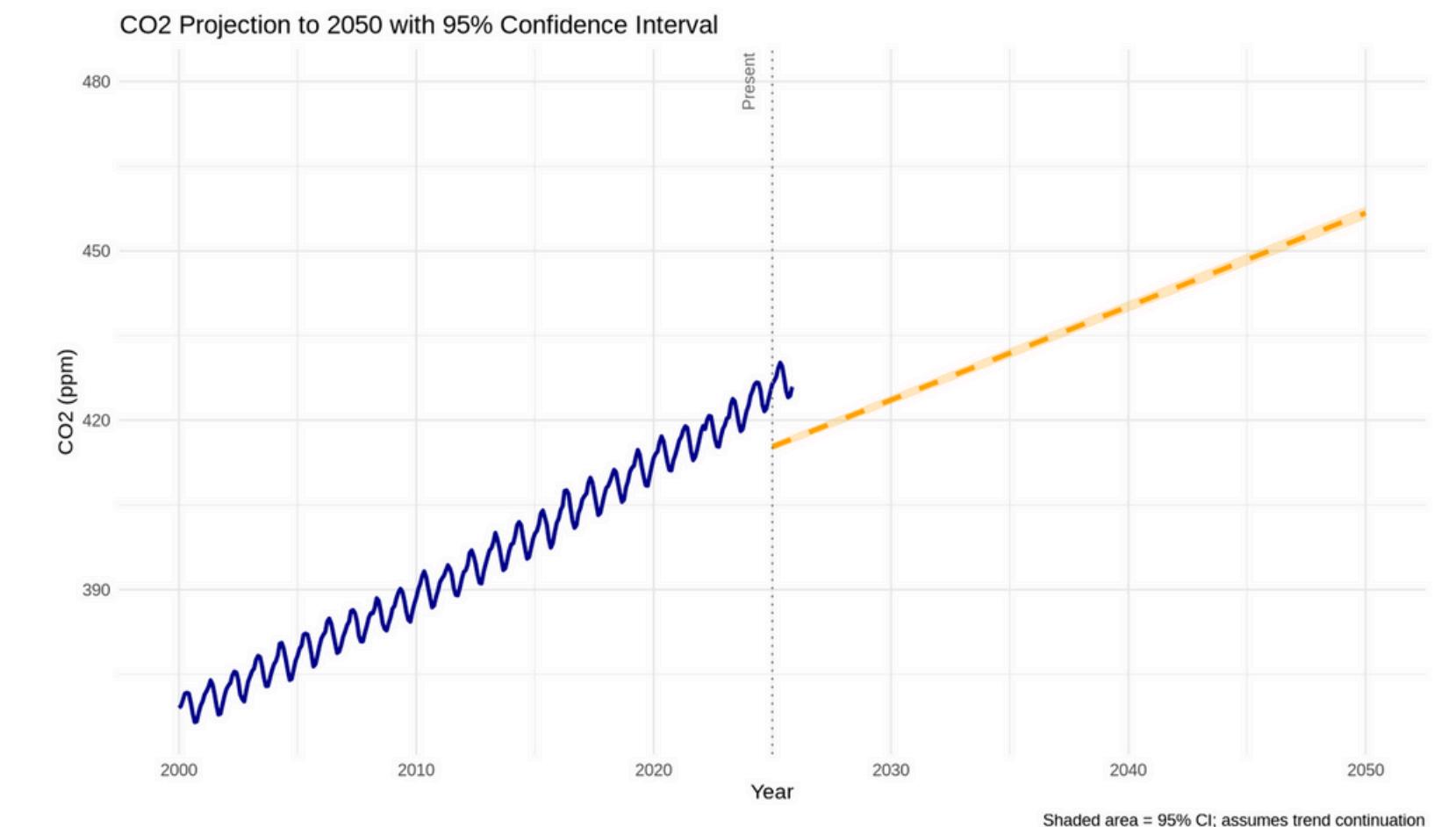
- **Compatibility:** Key tool for ADEME Scenario 3 (Technologies vertes) and Scenario 4 (Pari réparateur)
- **Role:** Monitor and verify the effectiveness of emission reduction policies and carbon capture technologies
- **Current Status:** Recent decade's growth rate (2.33 ppm/year) indicates a significant 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**