

# The Road to NPTI in Chile: From Opacity to Precision

Implementation, Standards, and Challenges (2016–2027)

ROBERT FRASER  
VERT FOCUS DAY  
MARCH 2026

# The Geography of Necessity



The Invisible Danger: Current opacity tests pass broken vehicles emitting millions of nanoparticles.

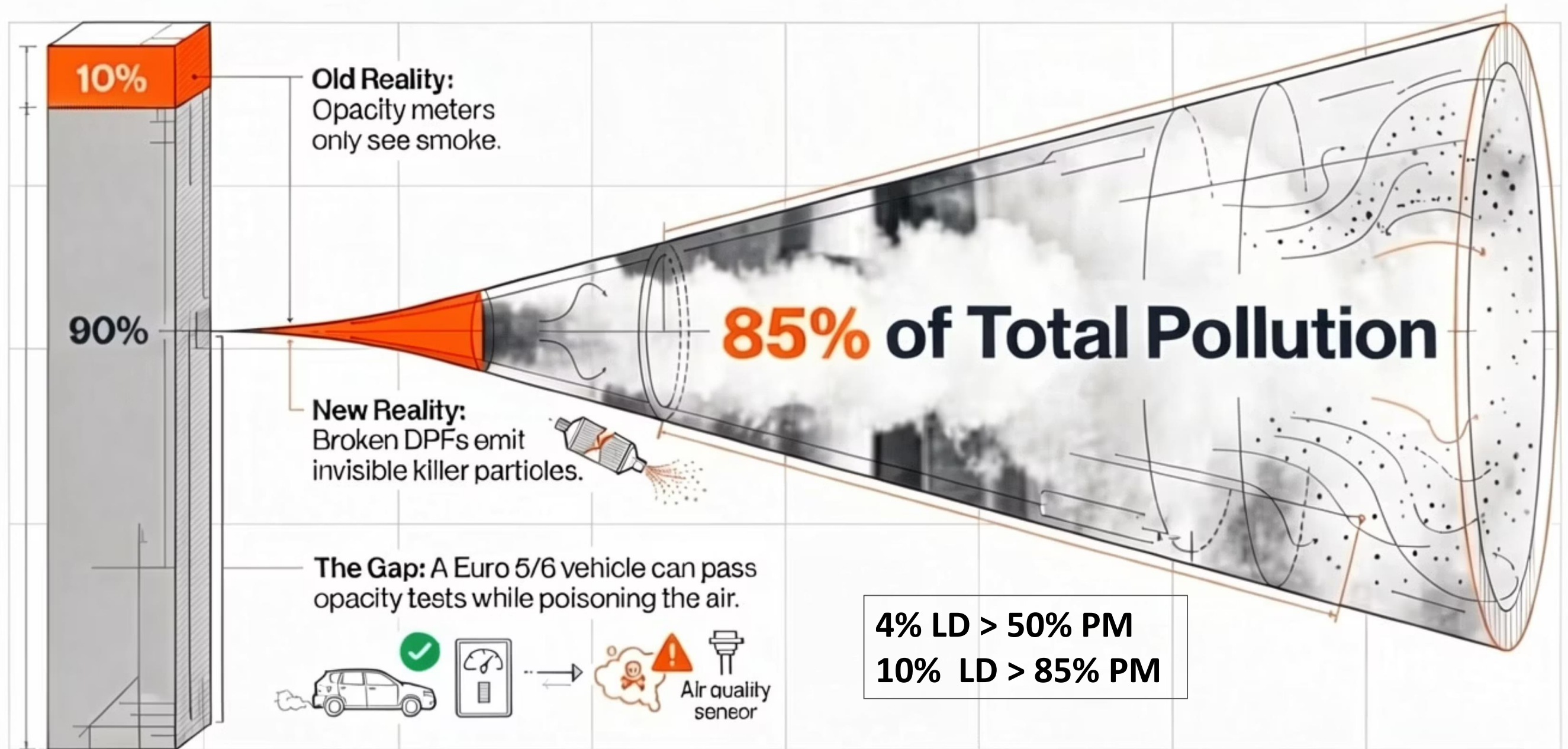
# The Illegal 'Deletion' Industry.



- Thriving black market for DPF removal
- Marketed as a maintenance solution
- Creates toxic super-emitters

Legal action initiated by former Minister of Environment against workshops.

# The Dirty Tail Paradigm

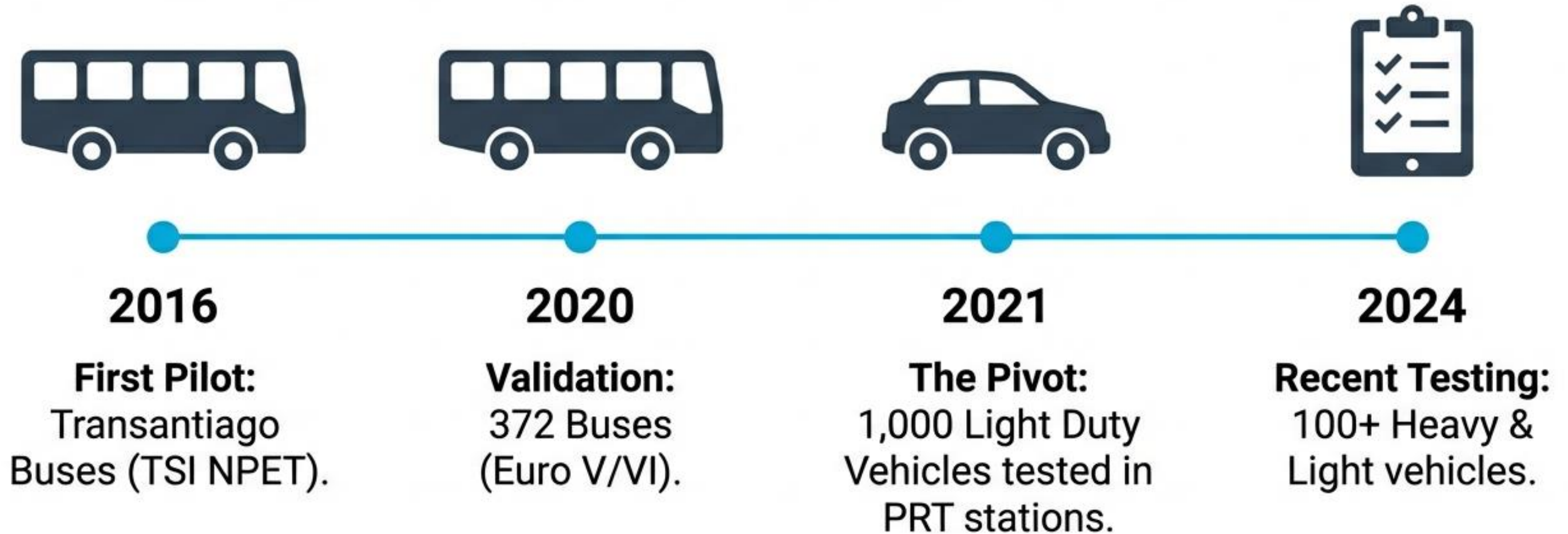


# The European Success Story



- **Belgium:** Implemented 2022
- **Netherlands:** Implemented 2023
- **Germany:** Implemented 2023
- **Switzerland:** Implemented 2023

# A History of Evaluation (2016–2024).



Technology proven in the local Chilean environment.

# The Latin American Roadmap

Market Context: Moving 137 fixed PRT stations from Opacity to PN.

**2024-2025**



New Tenders for  
PTI Concessions  
(13 Regions in Chile)

**May 2026**



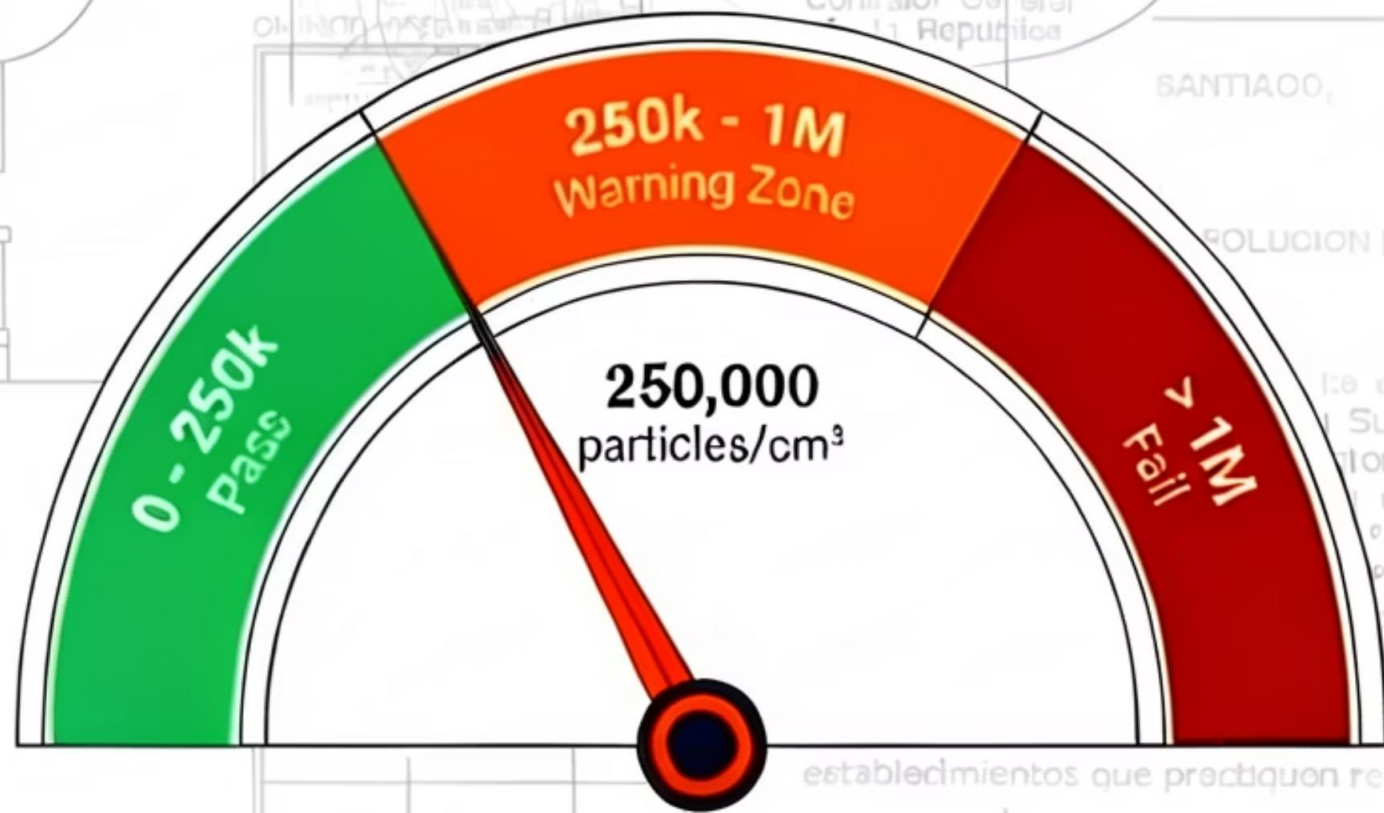
**Mexico:** Update to  
NOM-045-SEMARNAT

**2026-2028**



**Chile:** Full Implementation  
(Decree 4 Modification)

# The Recommended Standard



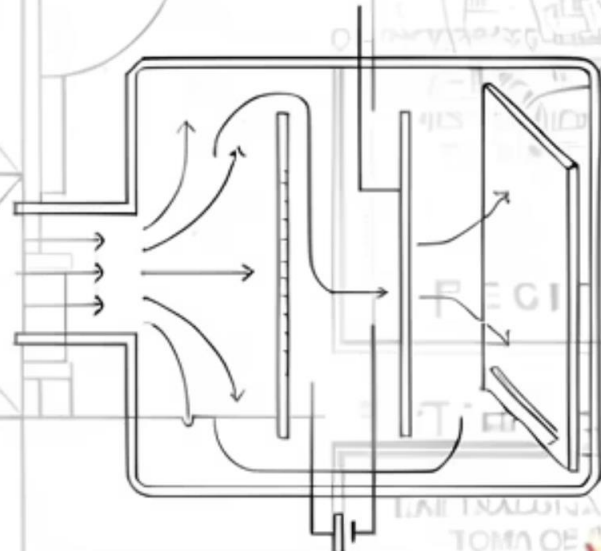
**Alignment:**  
EU Recommendation  
2023/688

**Limit: 250,000 #/cm<sup>3</sup>**

**Scope: Diesel Euro 5b/6+**

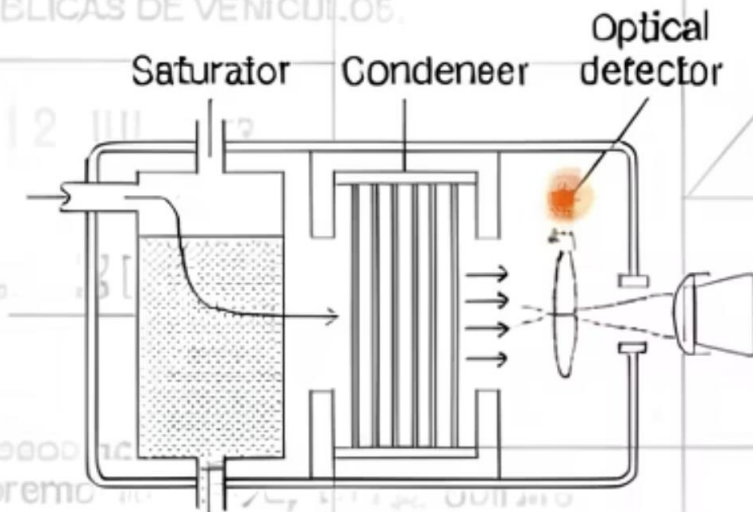
**Rationale:** Robust  
detection of broken  
DPFs (<10k vs >1M)  
with margin for error.

# Technology Neutrality



**DC Technology**  
(Field Robustness)

- ✓ **Detection Size:** 23nm – 200nm
- ✓ **Counting Efficiency:** >50% at 23nm
- ✓ **Volatile Removal:** >95% (Solid Particles Only)



**CPC Technology**  
(Lab Precision)

# The 30-Second Procedure

**Conditioning**  
(Engine Hot >60°C)



**Conditioning**  
(Engine Hot >60°C)

**Low Idle**



**Low Idle**

**Stabilization**  
(15s)



**Stabilization**  
(15s)

**Measurement**  
(15s Average)



**Measurement**  
(15s Average)

**Efficiency:** 'Fast Pass' logic enabled.  
No complex drive cycles. Minimal lane disruption.

# Implementation Roadmap (2025-2027)

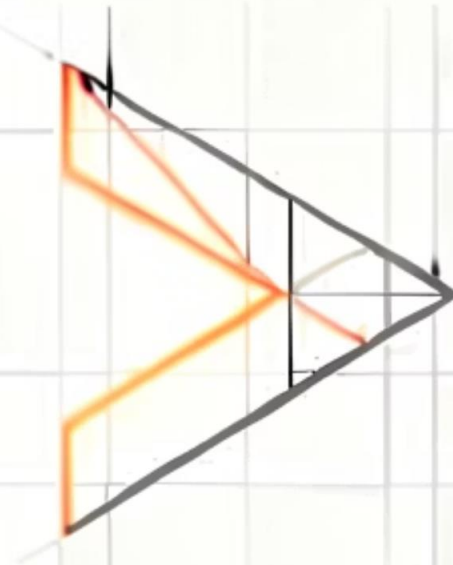


# The Economic Equation

## Equipment Cost

Investment: ~\$12,000 USD per line.

Maintenance: ~10% annual.

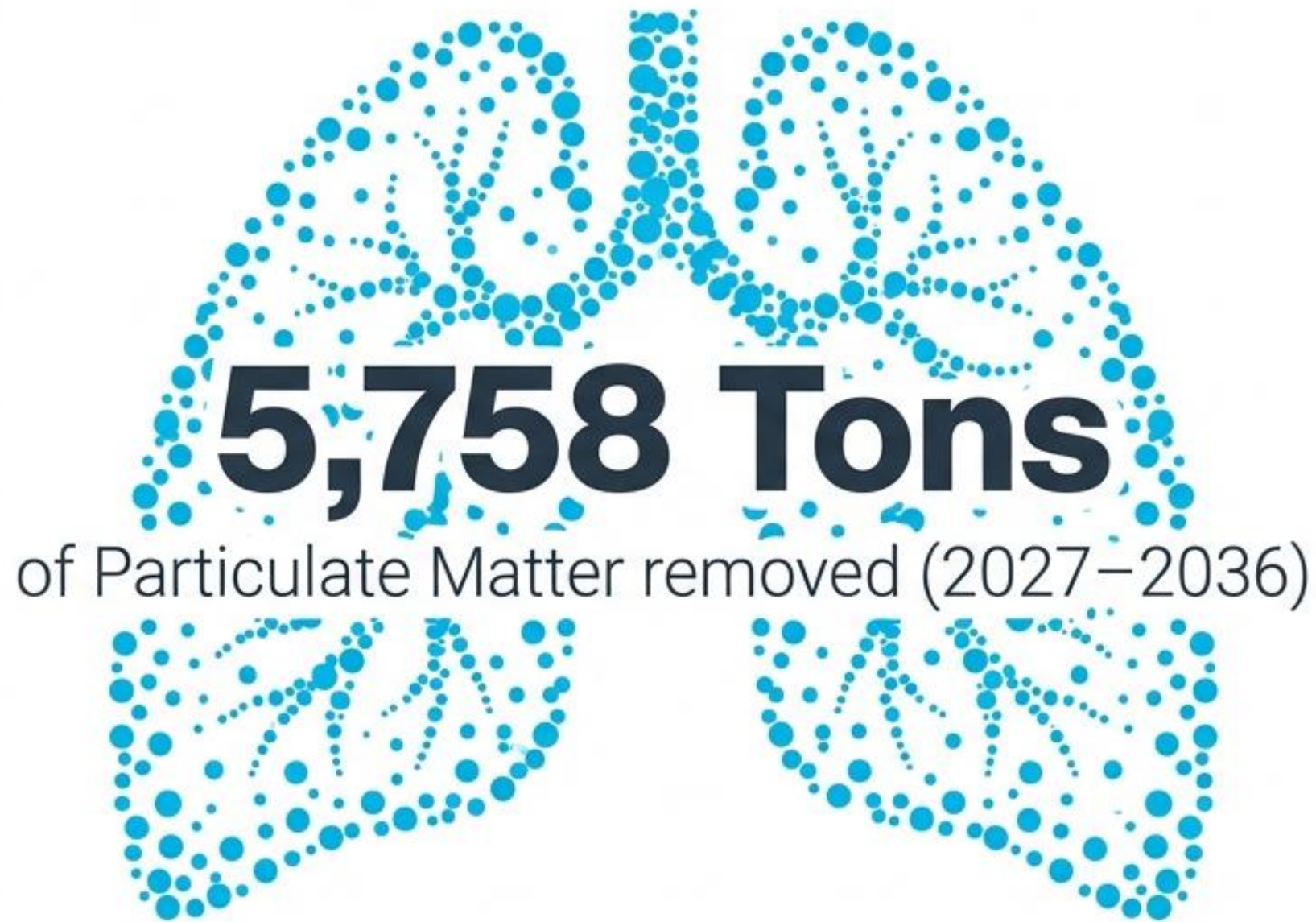


## Public Health Benefit

CALAC+ Study Benefit/Cost Ratio: 1.28 to 1.57

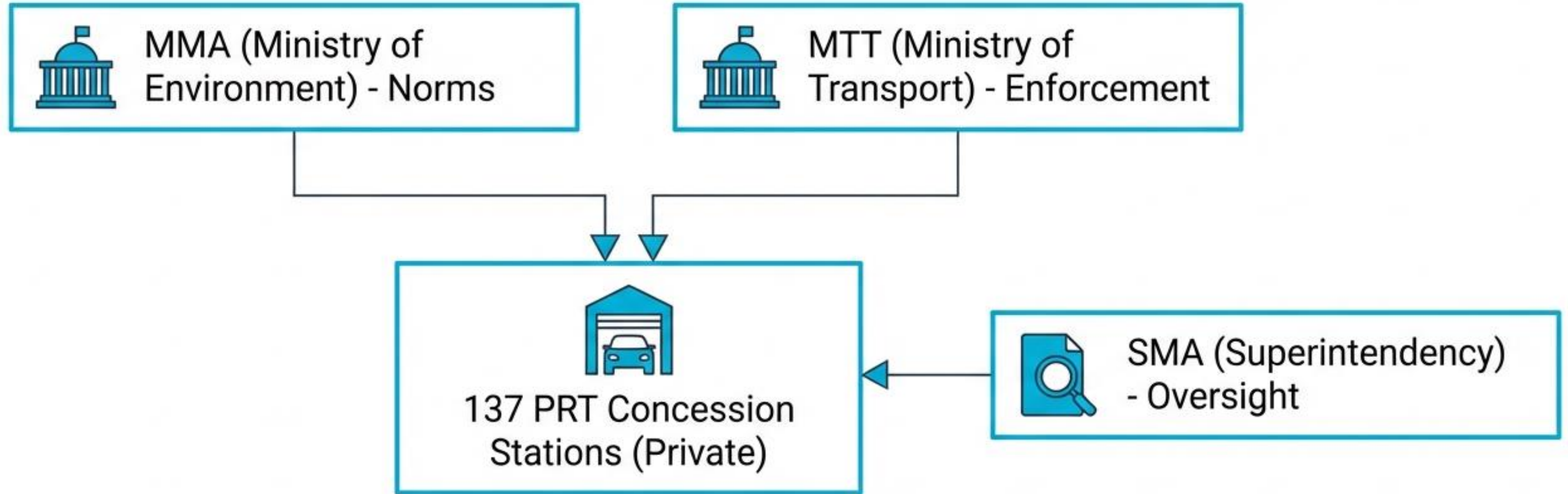
Reduced healthcare costs (Respiratory/Cardiovascular).

# The Expected Impact



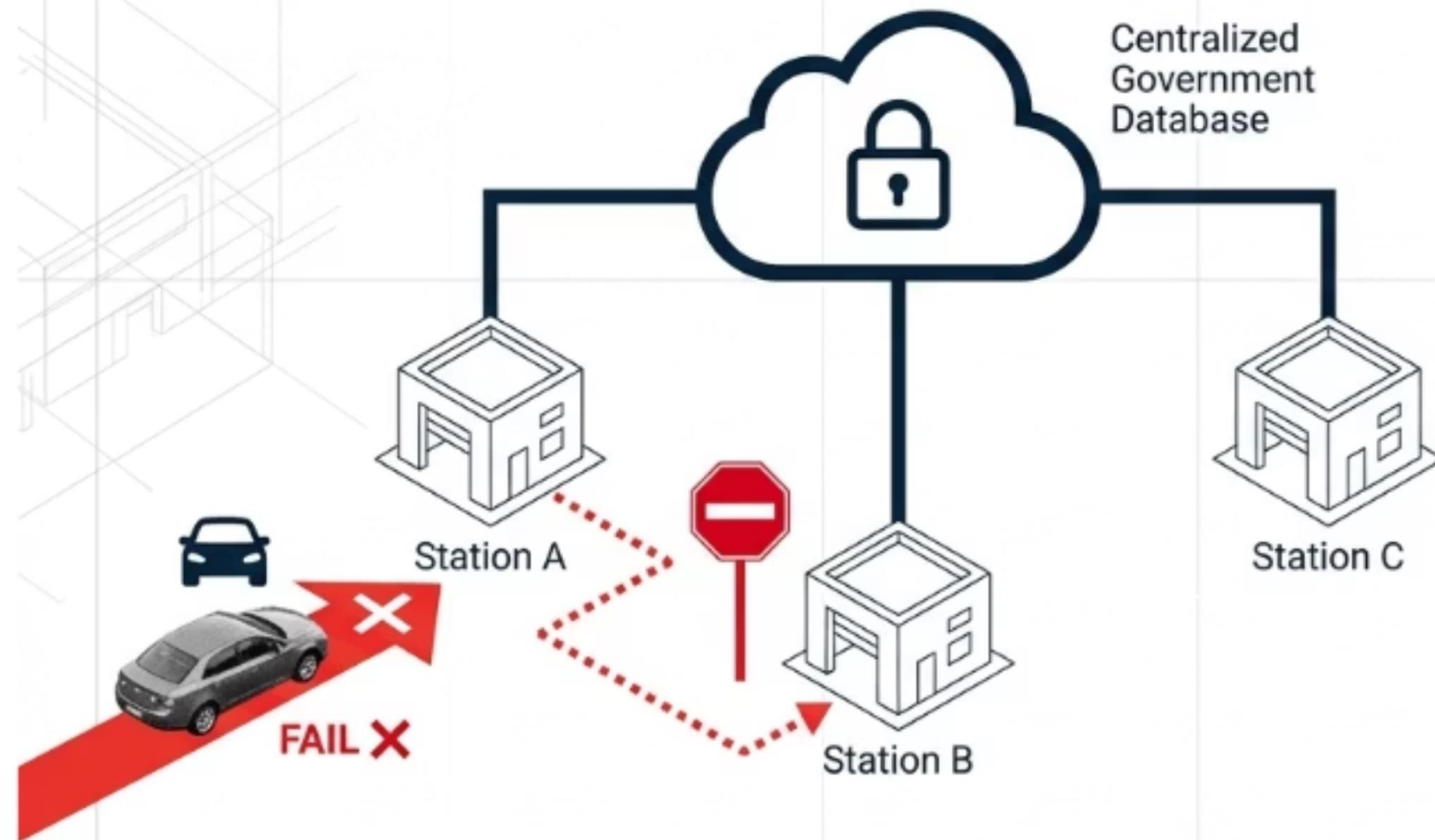
**Ensuring that Euro 6 investments actually deliver clean air**

# The Institutional Ecosystem.



New tenders (2025/2026) will mandate PN equipment.

# Threat 1: “Turismo de PRT” (Station Shopping)



✓ **Problem:** Drivers seeking lenient stations.

✓ **Solution:** Real-time **Data Integration**.

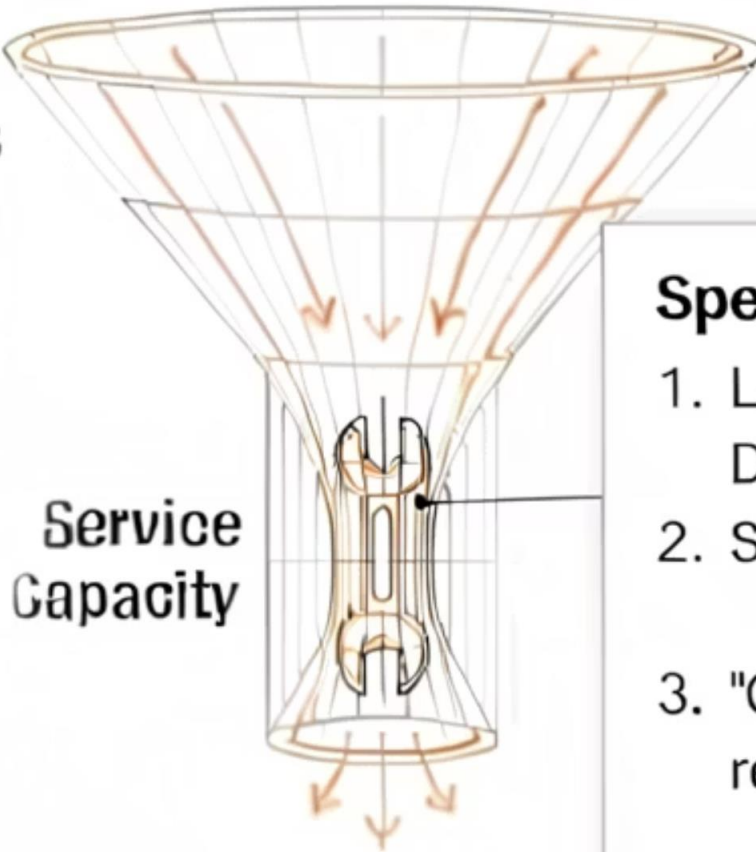
✓ **Encrypted** transmission.

✓ **Policy:** If you fail in Santiago, you fail in Valparaíso.

"A pragmatic proposal to strongly reduce urban PN pollution." — VERT Association

# Threat 2: The Repair Gap

High Rejection Rates  
(15-20%)



## Specific Issues:

1. Lack of Diagnostic Tools for DPFs.
2. Shortage of Replacement DPFs.
3. "Cleaning" scams vs. true repair.

# Threat 3: The Metrology Void

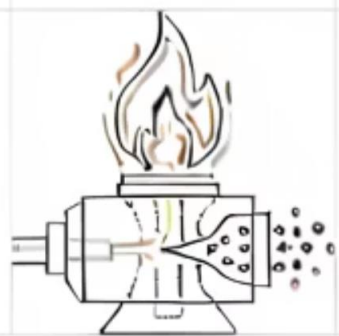


**Solution:** Regional  
Autonomy.

- Accredit local.  
(ISO 17025).
-

# Solving the Calibration Challenge

## The Scientific Ideal



### Soot (CAST)

- Best for Type Approval.
- Complex generation.



## The Field Reality



### Salt Aerosol (NaCl)

- Stable. Clean.
- Operationally Feasible.

Use Salt Aerosol

# Chile as the Latin American Blueprint.

- **Proven Technology** (2016–2024 Testing).
- **Defined Standard** (250,000 #/cm<sup>3</sup>).
- **Next Step:** Resolving Metrology.



A wide-angle photograph of a modern cable-stayed bridge at sunset. The bridge's two tall, white, A-frame pylons are the central focus, with numerous white cables fanning out to support the deck. The sky is a vibrant mix of orange, pink, and purple, transitioning into a deep blue at the top. In the background, a city skyline is visible with several buildings lit up. The bridge deck is empty, and the overall scene is brightly lit by the setting sun.

# Crossing the Bridge

**NPTI is not just a new rule. IT is the end of the "Dirty Tail" era.**

# Revised Emission Standards (DS 4/1994): NOx Control Protocol & 2026 Milestones

The 2026 MMA Technical Report confirms an **INDIRECT** control strategy for NOx via Urea quality verification.

## NOx Control Mechanism (PRT Standard)

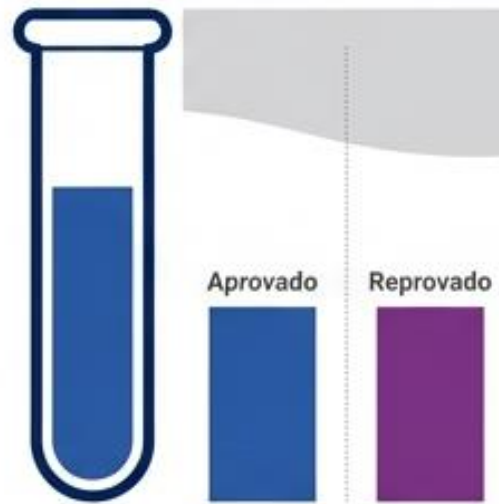
### Hero Insight

**CRITICAL DISTINCTION: INDIRECT CONTROL STRATEGY.** Unlike Particle Number (PN) counting, the 2026 NOx standard does not use direct tailpipe analysis. **Compliance is determined by verifying the quality of the reduction agent (Urea/AdBlue).**



### Inspection Protocol

- 1. Visual Inspection:** Verification of system integrity and component fitment.
- 2. Electronic Check:** OBD Interface analysis for diagnostic trouble codes.
- 3. Chemical Verification:** Urea Quality Assessment using Colorimetric scales or Refractometers.



## Legislative & Implementation Roadmap

- May 30, 2025:** Publication of Preliminary Draft (Anteproyecto) in D.O.
- Jun 6 – Sep 1, 2025:** Public Consultation Period.
- H1 2026:** Comptroller Review (Toma de razón).
- H2 2026 [TARGET]:** Publication in Official Journal (Diario Oficial).
- ~2028:** Entry into Force (18 months post-publication).

Source: Informe Técnico MMA (Feb 2026) – Section 4.

TARGET FLEET: Diesel Vehicles  
(approx. 2.1 Million)

ENVIRONMENTAL IMPACT: Projected reduction  
of 5,758 tons of MP2.5 (2027–2036)

DATA SOURCES: PPT\_reunion.pdf &  
Informe Técnico MMA Feb 2026