

# Product Requirements Document — Madrid O<sub>3</sub> Information Threshold Demo (MLP)

## 1) Purpose

Deliver a public, self-serve demo that shows when the ozone information threshold is exceeded in the Madrid agglomeration, and renders an Annex-style notice instantly. It proves correctness, speed, and reliability without needing prior buy-in from the authority.

## 2) Goals

- Detect O<sub>3</sub> ≥ 180 µg/m<sup>3</sup> (1 hour) using official station data.
- Present a clear status and a ready-to-publish notice in Spanish.
- Provide trust cues: timestamps, data freshness, change log.
- Keep scope tiny and lovable. No accounts. No outreach dependencies.

## 3) Users and Jobs

Primary user: duty staff in the municipal/regional air-quality team.

Job: see status at a glance, copy a correct notice fast, trust the numbers.

## 4) Regulatory anchor

EU Directive (EU) 2024/2881, Annex I Section 4: O<sub>3</sub> information threshold = 180 µg/m<sup>3</sup> (1 h).

## 5) Data Scope

- Area: Aglomeración de Madrid
- Pollutant: O<sub>3</sub> only
- Granularity: hourly values from fixed monitoring stations
- Units: µg/m<sup>3</sup>
- Time: last complete hour (UTC)

## 6) Outputs

/madrid page – badge, “Por qué”, Annex-style notice, station table, change log, freshness banner.

/madrid/status.json – machine-readable status, maxima, trigger station, data age, PDF link.

/madrid/latest.pdf – press-ready A4 mirror of the notice.

/madrid/methodology – sources, threshold rule, scope, caveats, attribution.

## 7) Status Logic

If any representative station ≥ 180 µg/m<sup>3</sup> → INFO\_EXCEEDED. Else COMPLIANT.

Debounce: two consecutive pulls required to change state.

Recovery: two consecutive hours < 180 µg/m<sup>3</sup> → COMPLIANT.

Freeze state if data\_age\_minutes > 90.

Computed fields: episode start, duration, highest 1 h and 8 h means, station table, placeholder forecast.

## 8) UX

Spanish labels, Europe/Madrid times, aligned numbers, visible “Por qué”, data-badge badge, change log, copy HTML + PDF buttons, accessibility labels.

## 9) Notice Content (Spanish)

Área – Aglomeración de Madrid

Tipo – Umbral de información O<sub>3</sub> (180 µg/m<sup>3</sup>, 1 h)

Inicio y duración – {inicio\_local}, {duración\_horas}

Valor máx 1 h – {valor} µg/m<sup>3</sup> en {estación}, {hora\_local}  
Media máx 8 h – {valor\_8h} µg/m<sup>3</sup>  
Pronóstico breve – texto estático  
Tabla de estaciones – {ID, nombre, valor, hora}  
Pie – vista previa no oficial + unidades.

#### 10) Data Acquisition Summary

Sources: EEA Air Quality Download Service (E2a Up■To■Date) and EEA Zones dataset.  
Filter: Country=ES, City=Madrid, Pollutant=O3, Aggregation=hour, last 48 h.  
Evaluate the latest complete hour; if any station ≥ 180 µg/m<sup>3</sup> → INFO\_EXCEEDED.  
Debounce + freeze on stale data > 90 min.

#### 11) Validation Checklist

- Synthetic 185 µg/m<sup>3</sup> test flips status after two pulls.
- State returns to COMPLIANT after two hours < 180.
- Data■age banner appears when > 90 min.
- Change log records every flip.

#### 12) Architecture (high■level)

Ingest → Process → Render → Publish → Store 7–30 days of data + logs.

#### 13) Acceptance Criteria

- Correct threshold detection.
- Notice fields render in Spanish.
- PDF timestamped and matching HTML.
- Explicit disclaimer on every page.

#### 14) Data Retrieval Addendum

- 1 – Identify zone (AQ Zones dataset → Aglomeración de Madrid polygon).
- 2 – Download EEA E2a Up■To■Date hourly O■ for Madrid (last 48 h). ZIP of Parquet files.
- 3 – Unpack, confirm units µg/m<sup>3</sup> and timestamps UTC.
- 4 – Compute latest complete hour, apply threshold logic.
- 5 – Generate status.json and notice page.

Guardrails – coverage ≥ 2 stations, freeze if stale, log corrections.

#### 15) Future Toggles

O■ alert + 3 h rule → CAP feed → approval toggle → Sentinel■4 context → NO■.

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This single document defines all goals, logic, and data handling for the Madrid ozone information■threshold demo. It should be followed exactly when building the first public prototype.