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Policy frameworks and local initiatives in Spain—examples of successful efforts to improve air quality in Spanish cities and institutions

Air Quality Improvement Measures in Catalonia: Legal Framework • Public Awareness • Mobility Solutions

Esther Sendra. UMH

Erasmus+ KA220 Cooperation Partnerships in Higher Education

Increasing the Visibility and Knowledge Base on Air Quality With Big Data and Its Impact on the Population Health

(VISIONAIR) 2023-1-SK01-KA220-HED-000158470

SUA Slovak University of Agriculture in Nitra

Universitas Catholica Ružomberok

UNIVERSITAS Miguel Hernández

University of Chemistry and Technology Prague

University of Zagreb

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Why Air Quality Matters

- **Health Impact:** Air pollution affects respiratory, cardiovascular, and immune systems
- **Vulnerable Groups:** Elderly, children, pregnant women, and those with pre-existing conditions
- **Development Effects:** Impacts lung and brain development in children
- **Life Expectancy:** Reduces overall quality and years of life
- **Barcelona Challenge:** Levels of PM10 and NO_2 exceed WHO recommendations

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UNIVERSITY OF CHEMISTRY AND TECHNOLOGY PRAGUE

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Legislative Framework

European Level

- Directive 2008/50/CE on air quality
- Directive 2004/107/CE on ambient air quality
- New Directive 2024/2881

National Level (Spain)

- Law 34/2007 - Air Quality and Atmospheric Protection
- Real Decreto 102/2011 - Air Quality Improvement

Regional Level (Catalonia)

- Decreto 322/1987 - Implementation of atmospheric protection
- Decreto 152/2007 - Action Plan for Air Quality Improvement (2007-2010)
- Agrement GOV/127/2014 - Air Quality Improvement Plan 2020 Horizon

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Catalonia's Air Quality Plan - Horizon 2027

Key Objectives:

- Maintain and improve air quality across all regions
- Ensure compliance with EU air quality standards
- Reduce exposure to harmful contaminants
- Prevent premature deaths and health impacts

Implementation Strategy:

- Division of Catalonia into 15 air quality zones
- Monitoring through XVPCA (Air Pollution Monitoring Network)
- Short-term action plans during high pollution episodes
- Collaboration with local municipalities

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Air Quality Monitoring System

XVPCA Network (Red de Vigilancia y Prevención de la Contaminación Atmosférica)

Responsible Entity: Air Surveillance and Control Service of Catalonia
Coverage: Network of monitoring stations across Catalonia
Data Usage: Evaluation and reporting to Spanish Government and EU Commission

Barcelona city Example: 11 Monitoring Stations

Urban Background Stations

- Palau Reial
- Zona Universitària
- Sants
- Ciutadella Park
- Poblenou
- Vall d'Hebron

Traffic Monitoring Stations

- L'Eixample
- Universitat
- Gràcia-Sant Gervasi

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Urban Background Stations

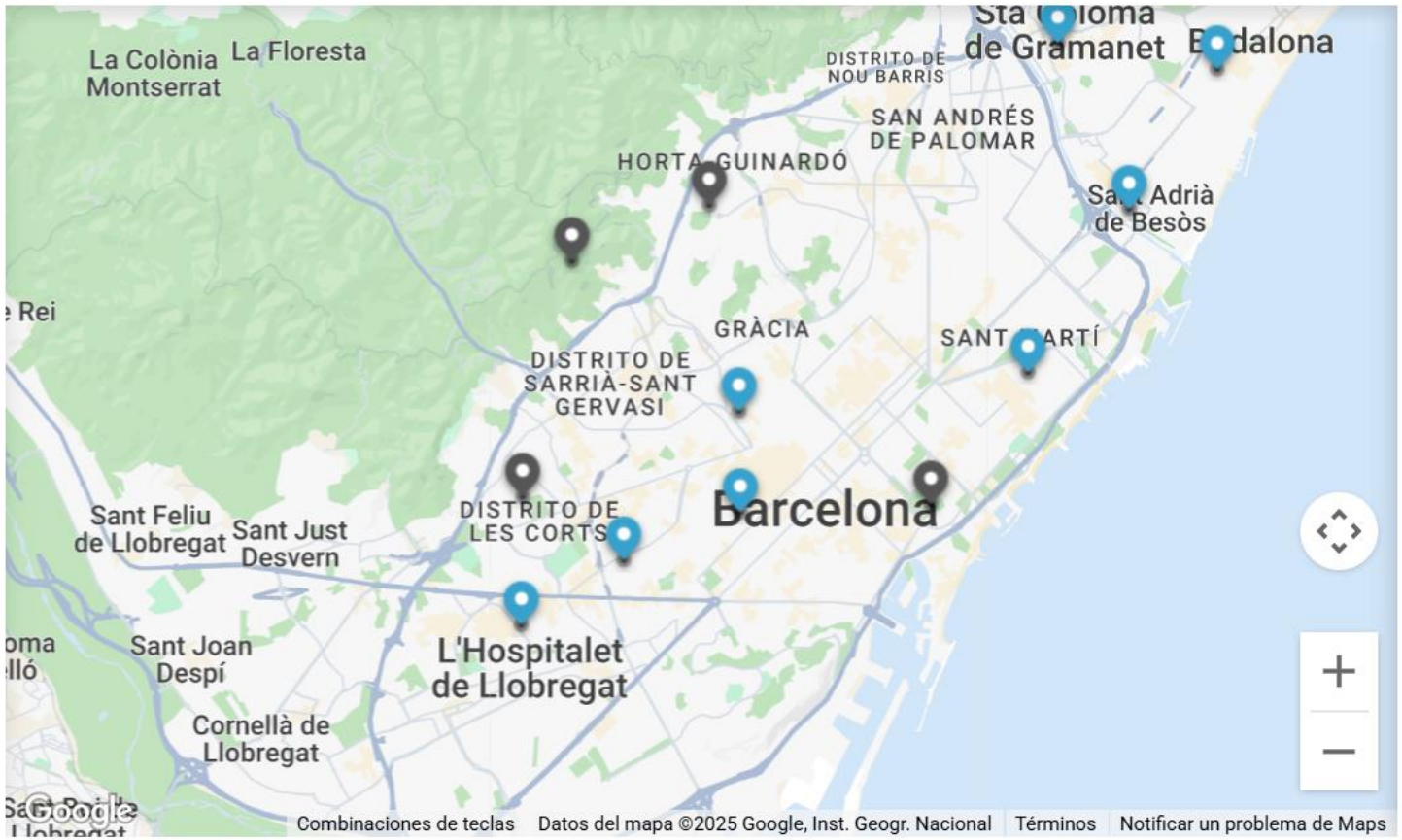
- Palau Reial
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- Ciutadella Park
- Poblenou
- Vall d'Hebron

Traffic Monitoring Stations

- L'Eixample
- Universitat
- Gràcia-Sant Gervasi



gencat | Medio Ambiente y Sostenibilidad



Calidad del aire:

Buena Razonablemente buena Regular Desfavorable Muy desfavorable

Extremadamente desfavorable Sin valor objetivo Sin datos

Estaciones

Grácia - Sant Gervasi

Spain, Catalonia, Barcelona
16:00, oct 18

Pronóstico horario →

44
ICA+ US

Bueno

Contam. principal: **PM2.5** **8 µg/m³**

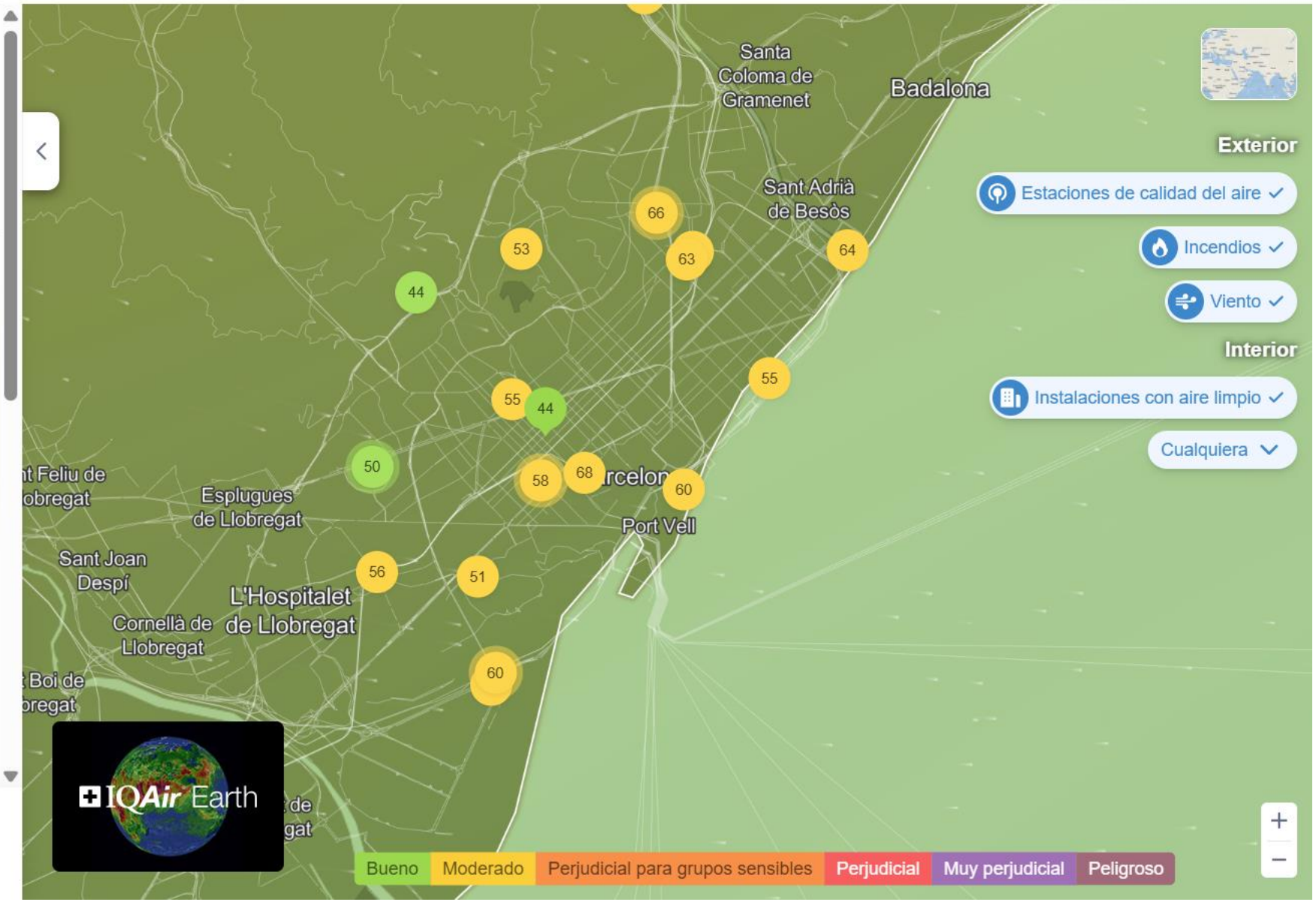
20° Broken clouds

Humedad 70%

Viento 18.5 km/h

Presión 1019 mbar

Ver detalle →



The Low Emission Zone (ZBE)

Overview

- **Geographic Coverage:** 95+ km² encompassing Barcelona and surrounding municipalities
- **Implementation Date:** January 1, 2020
- **Operating Hours:** Monday-Friday, 7:00 AM to 8:00 PM
- **Municipalities Affected:** Barcelona, L'Hospitalet, Cornellà, Esplugues, Sant Adrià

Primary Objective:

Reduce emissions through vehicle fleet renewal and promotion of sustainable mobility

What is the Barcelona Ring Roads Low Emission Zone?

The Barcelona Ring Roads LEZ also includes a protected area of over 95 km2 containing the Barcelona LEZ and the LEZ bounded by other neighbouring municipalities (Hospitalet, Cornellà, Esplugues and Sant Adrià). It is a protected area closed to vehicles that do not have a DGT environmental label. It is a measure designed to reduce the motor-vehicle air pollution and protect people's health.





When

The first LEZ regulation byelaw came into force on 1 January 2020. The LEZ has been governed by a new byelaw since 28 January 2023, including social improvements and facilities for occasional vehicle use. Since 1 January 2020.



Validity schedule

Working days, Monday to Friday.

From 7 am to 8 pm.



Fines

There is a single 200-euro fine for violating the byelaw, which is increased by 30% during a pollution episode. Proceeds obtained from fines will go towards funding initiatives for promoting sustainable mobility.



Exemptions

Vehicles used for transporting people with illnesses that limit their use of public transport. Vehicles used for transporting people with reduced mobility, emergency and essential services and foreign-licence vehicles that meet the requirements for travelling.



Permits

Occasional 24-day access, including vintage and classic vehicles. Vehicles used for transporting people who have to undergo periodic medical treatment. Special vehicles that provide an exceptional service or activity. Vehicles that undergo dynamic tests in a mechanic's workshop.Vehicles used by people whose annual financial income is less than 2 times the public indicator of income for multiple effects (IPREM). Vehicles used for professional purposes where the owner is soon to retire. Vehicles about to be replaced provided their owner can prove they have purchased a new vehicle.



Temporary restrictions per NO2 episode

Once an episode of atmospheric NO2 pollution is declared, and until it is de-activated, the granting of daily established permits halted, provided none has been applied for before the declaration of the episode.

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ZBE - Affected Vehicles

Restrictions Apply To:

- **Gasoline Cars:** Models before 2000 (Euro 3)
- **Diesel Cars:** Models before 2006 (Euro 4)
- **Motorcycles/Scooters:** Models before 2003 (Euro 2)
- **Vans/Trucks:** Models before 2005/2006 (Euro 4)
- **Buses:** Models before Euro 4 standard

Allowed Vehicles:

- Vehicles with DGT (traffic authority) environmental label: 0, ECO, C, or B
- Emergency services (police, fire, ambulances)
- Reduced mobility transport vehicles
- Essential services (medical, funeral)

ZBE - Penalties & Exemptions

Financial Penalties:

Regular Violation

€200 fine for unauthorized circulation

During Pollution Episodes

+30% increase in penalty amounts

Special Permits Available:

- Up to 10 daily authorizations per year (24-hour validity)
- For owners with annual income below 2× IPREM
- Healthcare and professional transport workers
- Historic and classic vehicles (limited access)

AMB Àrea Metropolitana de Barcelona

English

ZBE Rondes de Barcelona

LEZ | Vehicles affected | Register and permits | FAQs | Contact | Users access



Supporting Mobility Measures

Public Transportation Enhancement:

- **T-verde:** Free unlimited public transport for vehicle owners who scrap polluting cars
- **T-aire:** Subsidized 2-trip public transit card during high pollution episodes
- Expanded metro, bus, and tram networks

Active Mobility Infrastructure:

- 200+ km of bicycle lanes
- Pedestrian-priority streets and zones
- Park & Ride facilities at metropolitan entrances
- Bike-sharing and car-sharing programs

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Results & Impact

Emissions Reduction

31% reduction in environmental pollution since 2015

Particulate Matter (PM10)

Notable decrease in suspended particles

European Recognition:

London, Paris, Rome, and Milan have publicly endorsed Barcelona's ZBE implementation as a necessary measure against air pollution

Ongoing Monitoring:

Catalonia continues evaluating effectiveness and adapting measures based on air quality data and EU compliance requirements

Public Awareness Campaigns

Multi-Channel Approach:

- **Television Advertising:** Regular spots during high pollution episodes
- **Digital Platforms:** Real-time air quality information via websites and mobile apps
- **Social Media:** Daily updates and health recommendations
- **Street Signage:** Visual indicators at ZBE boundaries

Information Dissemination Channels:

- Municipal websites (Barcelona City Council)
- Generalitat de Catalunya official platforms
- Metropolitan Area of Barcelona (AMB) communications
- Public transport operator announcements

Air Quality Index (ICQA)

Catalan Air Quality Index - 6-Level Classification:

Color-coded system: Easy-to-understand visual representation for citizens

- Green: Good air quality
- Yellow: Acceptable quality
- Orange: Poor quality - vulnerable groups should limit activity
- Red: Very poor - health warnings issued
- Purple/Black: Extremely poor - emergency protocols activated

Real-time Updates: Citizens can check air quality at any moment for their location

Barcelona

Castellano

Mapas de datos ambientales

Datos de calidad acústica | **Datos de calidad del aire**

Área de información: Haz clic en el tramo para consultar sus datos

Niveles de NO_2 [µg/m^3] Valor guía OMS Valor límite UE

≤10 20 30 40 50 60 >70

Visualización : Niveles de inmisión media anual por tramos\NO_2\2024

Mapas

- [x] Niveles de inmisión media anual por tramos
- [ ] Previsión diaria
- [ ] Previsión horaria

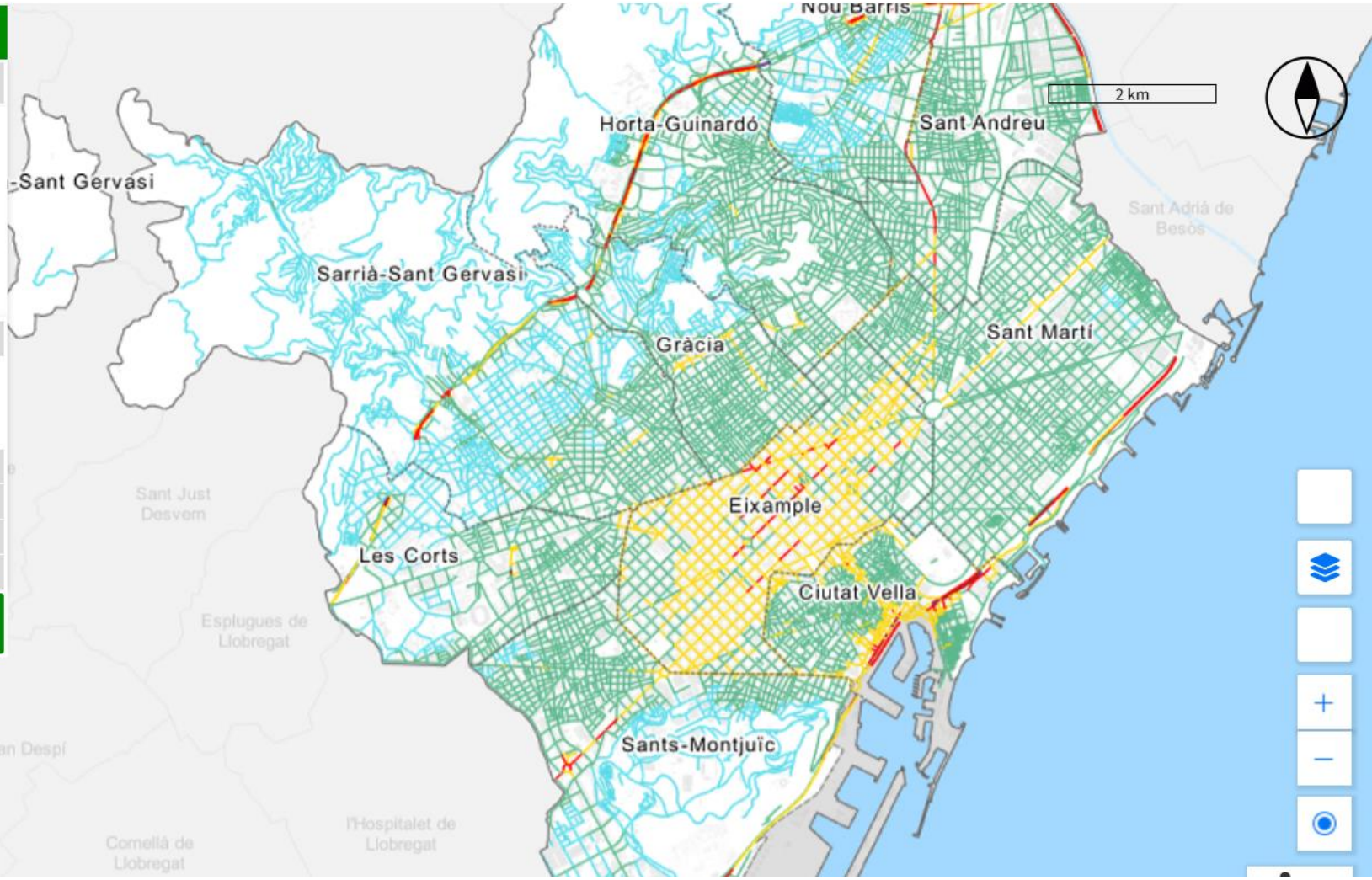
Contaminantes atmosféricos

Año

Estaciones de medida

Buscar dirección

Preguntas frecuentes (FAQ) | Contacto



Health Protection Measures

During High Pollution Episodes:

- **Traffic Restrictions:** Most polluting vehicles banned from ZBE
- **Public Notifications:** Health alerts via TV, radio, and digital channels
- **Transport Incentives:** Free or subsidized public transit (T-aire card)
- **Municipal Actions:** Increased street cleaning and watering
- **Health Recommendations:** Especially for elderly, children, and respiratory patients

Prevention Focus:

- Reduce outdoor physical activity in sensitive groups during alerts
- Use of air purifiers in homes
- Remote work encouragement when possible

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Citizen Engagement & Education

Awareness Programs:

- School education on environmental impact of transportation
- Community events promoting sustainable mobility
- Workshop programs on vehicle alternatives

Accessibility of Information:

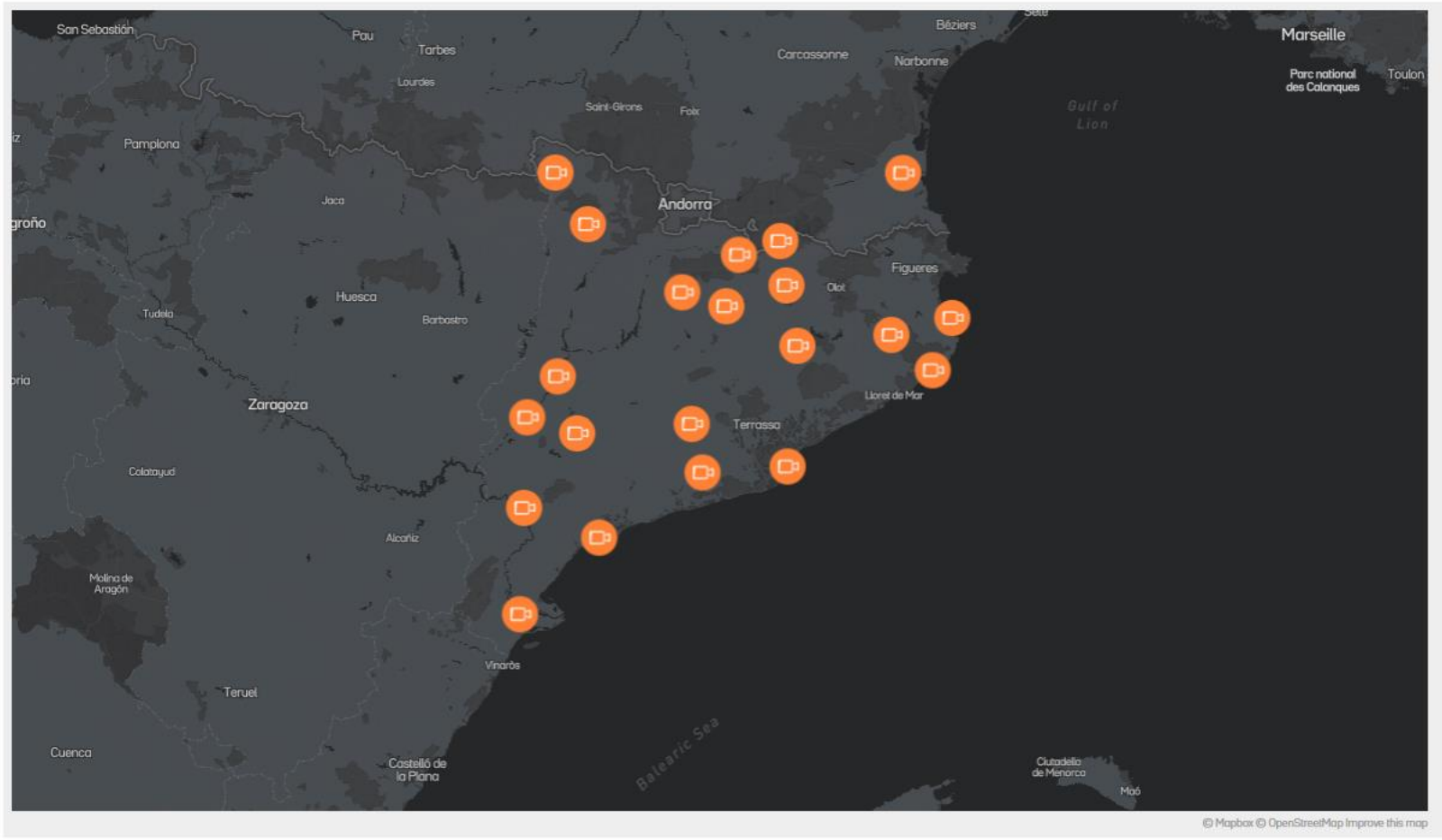
- Comprehensive websites with FAQs and regulations
- Online registration systems for ZBE authorization
- Multilingual support for residents and businesses
- Direct contact channels for municipal assistance

Behavioral Change:

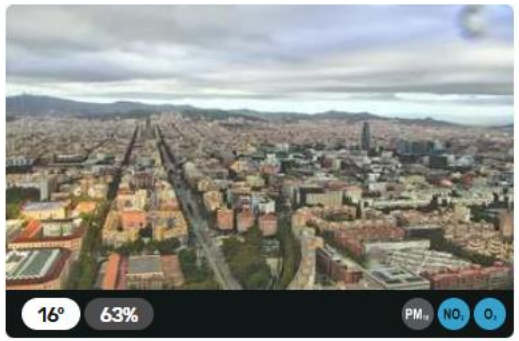
Normalized practices: recycling, water conservation, energy efficiency, sustainable transportation choices

El Temps · Quin temps fa ara?

Les càmeres d'El Temps

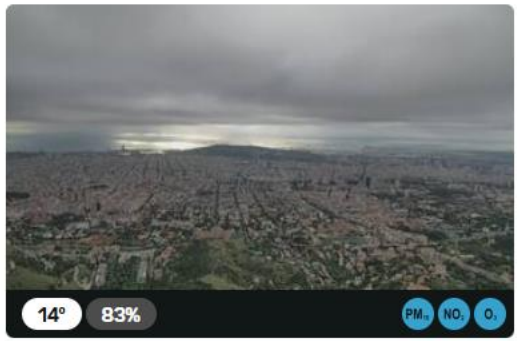


Real time cameras: Public Televison 3CAT



Barcelona, Port Olímpic

Fa 24 minuts



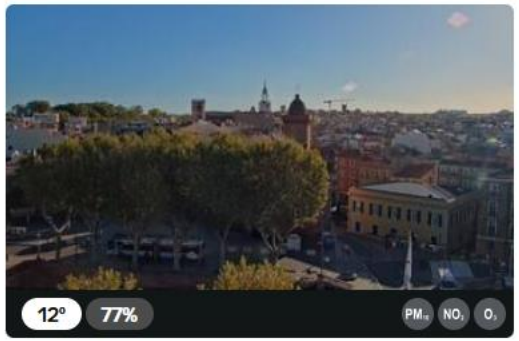
Barcelona, Collserola

Fa 24 minuts



Sant Joan Despí, TV3

Fa 23 minuts



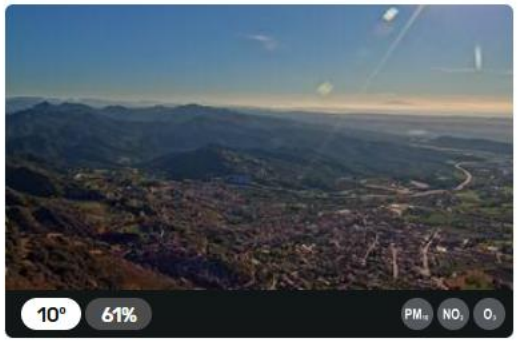
Perpinyà

Fa 23 minuts



Vic

Fa 23 minuts



Santuari de Queralt

Fa 23 minuts

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Forecast in Public Televison 3CAT



Public authorities App AIRE.CAT



https://mediambient.gencat.cat/ca/05_ambits_dactuacio/atmosfera/qualitat_de_laire/descarrega_app/

Future Developments (2025 and Beyond)

Enhanced Restrictions:

- From January 2025: Further tightening of vehicle access requirements
- Label B vehicles restricted during high pollution episodes
- Stricter regulations for residents within ZBE

Planned Initiatives:

- Expanded ZBE implementation in other Catalan municipalities
- Electric vehicle promotion through tax incentives
- Green mobility infrastructure expansion
- Continued monitoring and adaptation based on air quality data

Comparative European Context

ZBE Adoption Across Europe:

- **230+ Cities:** Have implemented Low Emission Zones
- **Proven Effectiveness:** Notable effects on particulate matter reduction
- **Barcelona's Leadership:** Pioneer in Spain's ZBE implementation (2020)

EU Legal Mandate:

- All Spanish municipalities with 50,000+ inhabitants must establish ZBE by 2023
- Barcelona exceeded this requirement by implementing in 2020
- Catalonia aligns with EU air quality directives and standards

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Television Programs for Environmental Awareness

"El Medi Ambient" - TV3

Director: Xavier Durán
Format: Daily 3-minute informative and educational program specialized in environmental topics
Broadcast: Monday-Friday, after Regional News (Telenotícies Comarques)
Duration on Air: Since March 23, 1992 (30+ years of continuous broadcasting)
Focus Areas: Air quality, energy savings, waste management, environmental innovation, and sustainable practices
Impact: Pioneer program in European television for daily environmental coverage; widely used in schools and educational institutions



La Marató de TV3 2024 - Respiratory Diseases

Overview

- **Date:** December 15, 2024
- **Edition:** 33rd edition of La Marató de TV3
- **Focus:** Respiratory diseases and air quality
- **Theme:** "A pleno pulmón" (Full Lungs)
- **Broadcaster:** TV3 and 3Cat (Public Television of Catalonia)

Key Statistics:

- 2 million people in Catalonia affected by respiratory diseases
- 27 deaths daily from respiratory conditions (1 every hour)
- Third leading cause of death in Catalonia
- 10,000 deaths annually (2022 data)

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3cat
La Marató de 3Cat
fundació la marató
fes el teu donatiu
més info
La Marató
3cat
El marcador final de La Marató 2024
5 min
Descobrim el marcador final: milions de gràcies per aquest gran alè d'esperança!
MIRA-HO ARA

La Marató 2024 - Format Innovation

Unique Broadcasting Approach:

- **First Time Outdoors:** Program aired outdoors for the first time to emphasize the need for clean air
- **Multiple Venues:** Simultaneous broadcasts from 4 strategic locations across Catalonia
- **Focus on Natural Spaces:** Three outdoor studios in UNESCO protected areas and natural parks

Broadcasting Locations:

1. Illa de Gràcia - Ebro Delta (UNESCO Biosphere Reserve)
Focus: Air quality importance
2. Parc del Segre - Seu d'Urgell
Focus: Sports and healthy lifestyle
3. Parc de la Devesa - Girona
Focus: Medical research
4. Parc Audiovisual - Terrassa (Former Thorax Hospital)
Central studio location

La Marató 2024 - Educational & Awareness Campaigns

Education Initiatives:

- **6,000+ Educational Sessions:** Divulgative presentations in secondary schools, vocational centers, and libraries
- **Reach:** Over 200,000 young people across Catalonia
- **Support:** Collaboration with Department of Education and Professional Training
- **Format:** Specialized videos in "QuèQui" format for youth engagement

Campaign Focus Areas:

- Consequences of air pollution and climate change
- Prevention of respiratory diseases through healthy lifestyle
- Tobacco prevention (including vaping and other substances)
- Promotion of physical activity and sports

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La Marató 2024 - Funding & Research Impact

Historical Impact (Foundation La Marató de TV3):

Since 1992

€245 million raised for research (more than 6 million raised in 2024)

Research Projects Funded

1,022 projects

Research Teams Involved

1,710 research teams

Researchers

10,000+ researchers

2024 Objective:

Improve prevention, early diagnosis, treatment, and rehabilitation of respiratory diseases

Environmental Advocacy on TV3

Content Strategy:

- **Scientific Rigor:** Expert participation and evidence-based information
- **Testimonial Approach:** Real stories from patients and healthcare professionals
- **Holistic Coverage:** Environmental, social, and health interconnections
- **Accessibility:** Simplified scientific content for general public

Target Audiences:

- Youth and students (special emphasis on tobacco prevention)
- Families with respiratory health concerns
- General population for health awareness
- Healthcare professionals for educational updates

Co-funded by the European Union

Campaign Messaging & Dissemination

Key Messages:

- "We only need the air we breathe and the love of others"
- Connection between air quality and respiratory health
- Climate change as environmental and health threat
- Prevention through healthy choices and lifestyle changes

Media Channels:

- Television broadcasts on TV3 and 3Cat platforms
- Social media campaigns (#LaMarató #APlenoPlumón)
- Online video content and documentaries
- Documentary films and special reports
- Radio segments and podcast content
- Educational materials distribution

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Nits sense ficció

IT'S IN THE AIR

Documentary on the chemical industry as a source of air pollution

December 2019



3cat 3 Catràdio 3cat info EVA

Coneix-nos Atenció a l'audiència Premsa La Marató

DIMARTS, A LES 21.55

"Sense ficció" estrena la coproducció de TV3 "És a l'aire", sobre l'impacte mediambiental de la indústria química al Camp de Tarragona

Demà, dimarts, a les 21.55, "Sense ficció" estrena la coproducció de TV3 "És a l'aire", de Christophe Sion i Santi Suárez, sobre un estudi independent realitzat per un equip de científics que tracta la contaminació de l'aire al voltant del complex petroquímic més gran del sud d'Europa, el del Camp de Tarragona.

09/12/2019 - 13.43

Imprimir

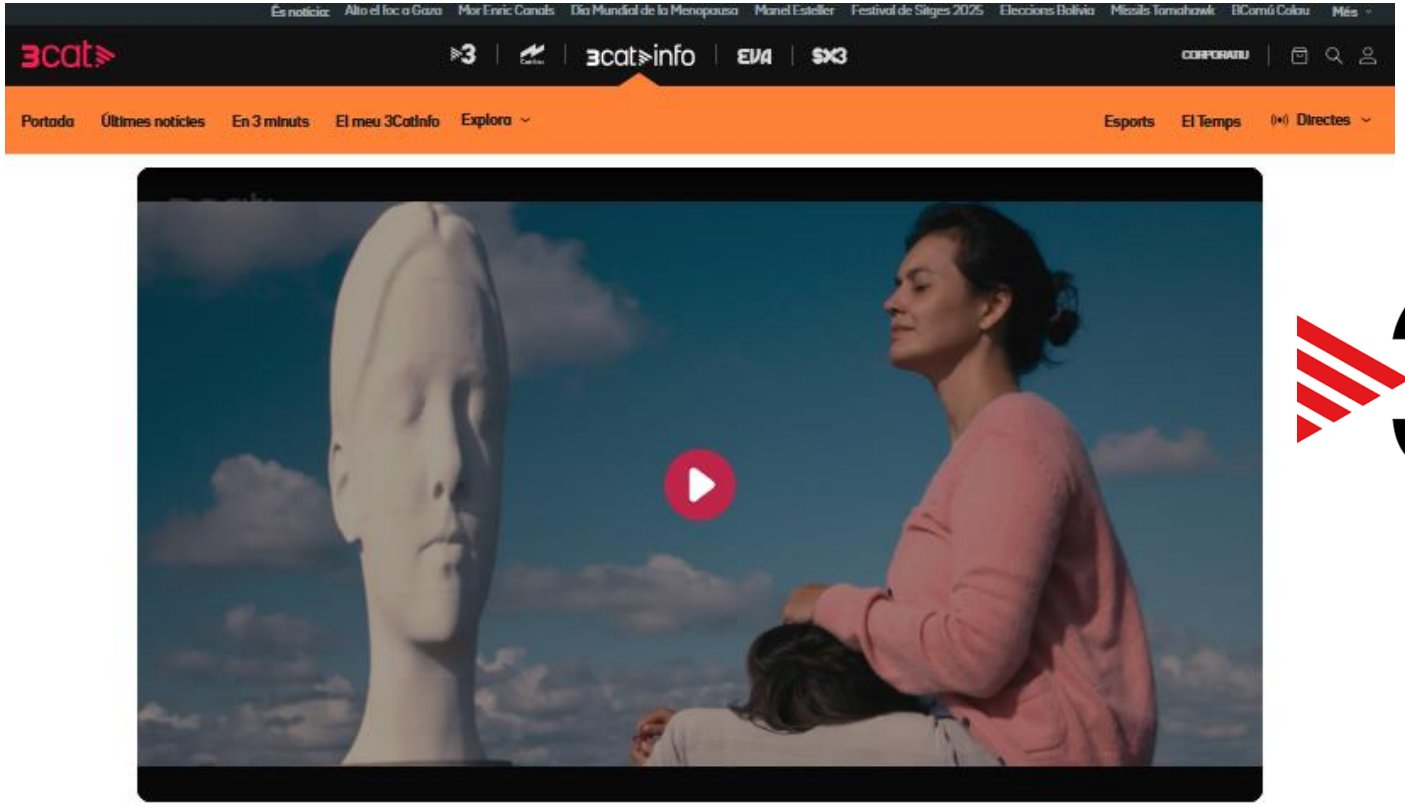
Co-funded by the European Union

Nits sense ficció

BREATHE, MUM

Documentary on the Right to Clean Air and Air Pollution as a Determinant of Disease.

December 2024



Other Environmental Programs on TV3

Complementary Environmental Coverage:

- **Documentaries on Environmental Topics:** Regular features addressing air quality, pollution, and climate issues
- **Regional News Coverage:** Daily reporting on air quality alerts and environmental policies
- **Special Reports:** In-depth investigations on pollution sources and health impacts
- **Interactive Content:** Viewer participation in environmental awareness initiatives

Partnership with Environmental Organizations:

- Collaboration with public health agencies
- Research institution partnerships
- NGO environmental advocacy support
- Municipal and regional government coordination

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Digital Platforms & Real-Time Information

Online Air Quality Tools (Generalitat de Catalunya):

- **Air Quality Portal:** Real-time monitoring data accessible 24/7
- **Mobile Applications:** ICQA app for instant air quality checks by location
- **SMS Alerts:** Automatic notifications during high pollution episodes
- **Email Updates:** Subscribe to air quality reports and health recommendations

Integration with Broadcasting:

- TV news broadcasts include daily air quality segments
- Teletext and digital TV information services
- Streaming content with environmental news updates
- Interactive graphics showing pollution zones and trends

Community Initiatives & Public Events

La Marató Community Engagement:

- **Local Events:** Fundraising activities in towns and cities across Catalonia
- **Health Screenings:** Free respiratory health checks offered to public
- **Sports & Recreation:** Organized physical activities promoting active lifestyles
- **Family Activities:** Educational workshops for all ages

Volunteer Programs:

- Thousands of volunteers participating in event organization
- Health professionals offering free consultations
- Student volunteers engaged in awareness campaigns
- Community leaders as environmental ambassadors

School & Educational Outreach

Youth Education Programs:

- **Curriculum Integration:** Environmental education in secondary schools
- **Specialized Sessions:** 6,000+ educational presentations in schools
- **Resource Materials:** Didactic kits for teachers and students
- **Smoking Cessation Programs:** Tobacco and substance abuse prevention

Educational Content:

- Videos explaining respiratory diseases and air pollution
- Interactive quizzes and learning games
- Case studies from patient experiences
- Research career information and opportunities

Healthcare Professional Engagement

Medical Community Involvement:

- **Research Funding:** Direct support for respiratory disease research projects
- **Professional Training:** Updates on latest treatment and prevention approaches
- **Conference Participation:** Medical professionals present findings at La Marató symposia
- **Clinical Guidelines:** Development of best-practice protocols

Hospital & Healthcare Facility Partnerships:

- Patient education programs at healthcare centers
- Respiratory rehabilitation clinics
- Smoking cessation support services
- Early diagnosis screening initiatives

Success Stories & Public Impact

Awareness Achievements:

- **Tobacco Reduction:** Decreased smoking rates in youth following campaigns
- **Early Diagnoses:** Increased respiratory disease detection through screening programs
- **Behavioral Change:** More citizens adopting clean air practices
- **Political Action:** Environmental policies strengthened due to public pressure

Research Breakthroughs:

- Novel treatment developments for respiratory conditions
- Better understanding of air pollution health impacts
- Rehabilitation method improvements
- Environmental health research expansion

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Integration: Legal Framework & Public Communication

Synergy Between Policy & Campaigns:

1. Legal Measures → Public Understanding

ZBE regulations explained through accessible media campaigns, helping citizens understand WHY restrictions exist

2. Health Data → Educational Content

Air quality monitoring results translated into public health messages during broadcasts

3. Research Findings → TV Programming

Latest respiratory disease research disseminated through TV3 environmental programs

4. Community Action → Policy Evolution

Public engagement through campaigns influences regulatory development and environmental policies

Conclusion & Key Takeaways

Comprehensive Approach:

Catalonia combines legislation, monitoring, enforcement, public awareness, and educational campaigns to address air quality challenges

Media as Change Agent:

TV3 and La Marató serve as crucial channels for environmental awareness and health education, reaching thousands through diverse programs

Measurable Impact:

31% reduction in air pollution since 2015; significant research advances; behavioral changes in target populations

Ongoing Commitment:

Continuous evolution of policies, campaigns, and infrastructure to meet WHO standards and protect citizen health

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