



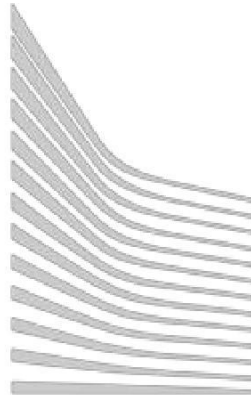
**pureti**™

Soluciones sostenibles ... *por un Mundo Limpio*

Use the Power of Light to Clean™

Use the Power of Light to Clean

# Winners of the European Union iSCAPE Project to Reduce Pollution

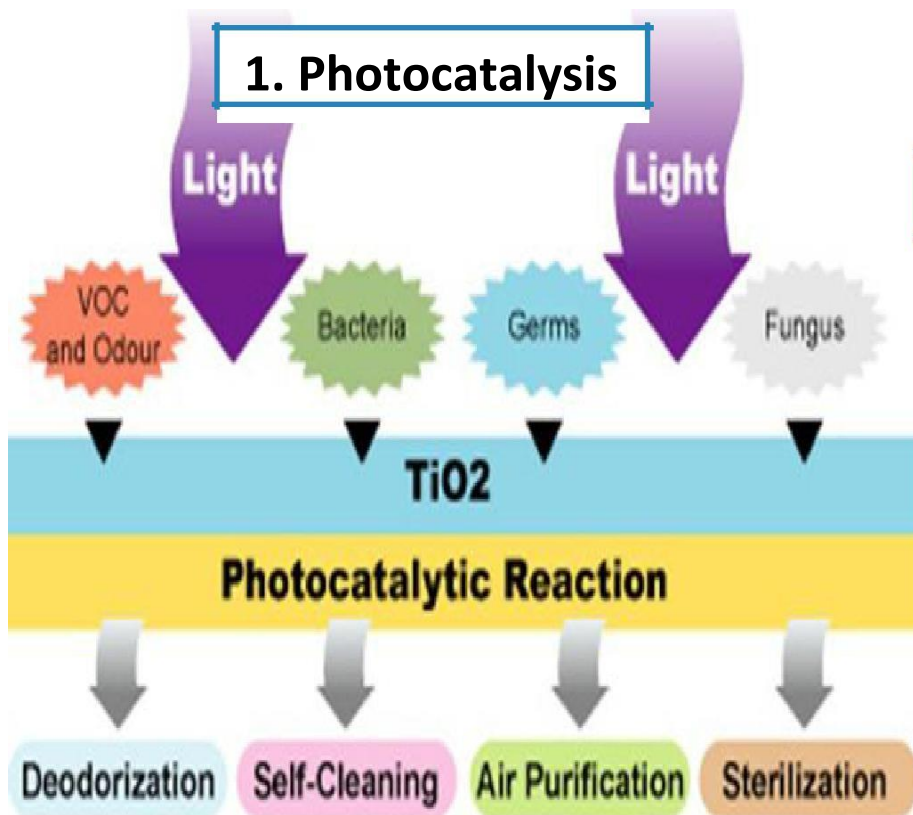


**This project received funds from the Horizon 2020 research and innovation program under grant no. 689954**

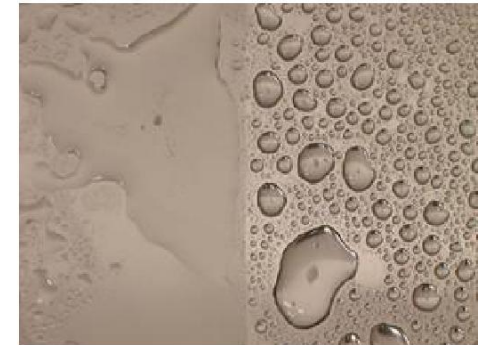
Trinity College Dublin (IRE), M.I.T. (USA), Università di Bologna (IT), University of Surrey (UK), Ilmatieteen Laitos (FIN), Universiteit Hasselt (BEL), Technische Universität Dortmund (GER), JRC -Joint Research Centre- European Commission (BEL), Institut d'Arquitectura Avancada de Catalunya (ESP), T6 Ecosystems srl (ITA), Pureti (ESP-USA).

# How PURETi Works

**PURETi** creates self-cleaning surfaces that *purify the air* by means of three fundamental processes. The molecular decomposition of organic matter.



2. Hydrophily



3. Oleophobia



# Benefits and uses of PURETi indoors

- Less diseases are propagated, reducing them by 25%.\*
- Surfaces must receive enough artificial or natural light.
- It is applied to windows, walls near windows, lamps, curtains and blinds.
- High destruction of VOC's and dust in the air to reduce the risk of semicircular lipomatrophy.

## OCCUPATIONAL HEALTH

Improved indoor air quality.

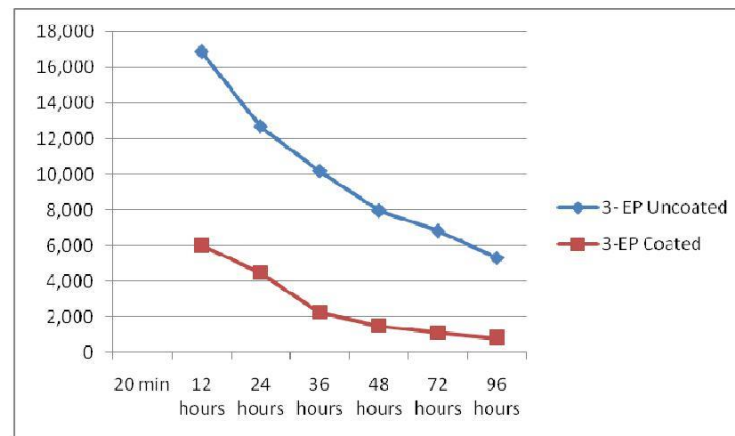
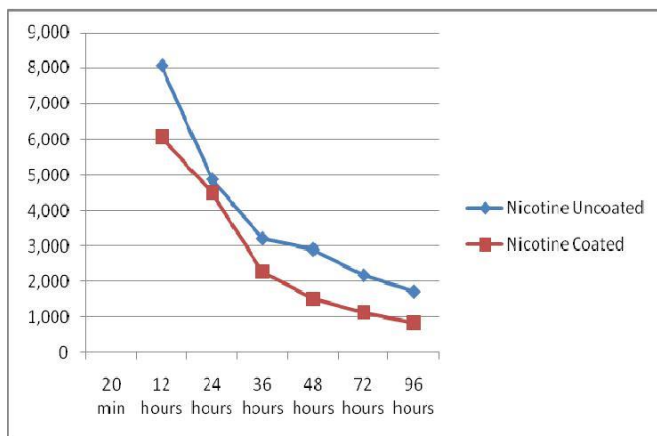
- Reduces VOC's, allergens, particles (dust).
- Reduces odors.

Keeps surfaces cleaner.

- Easier cleaning.
- Part of a hygienization program.

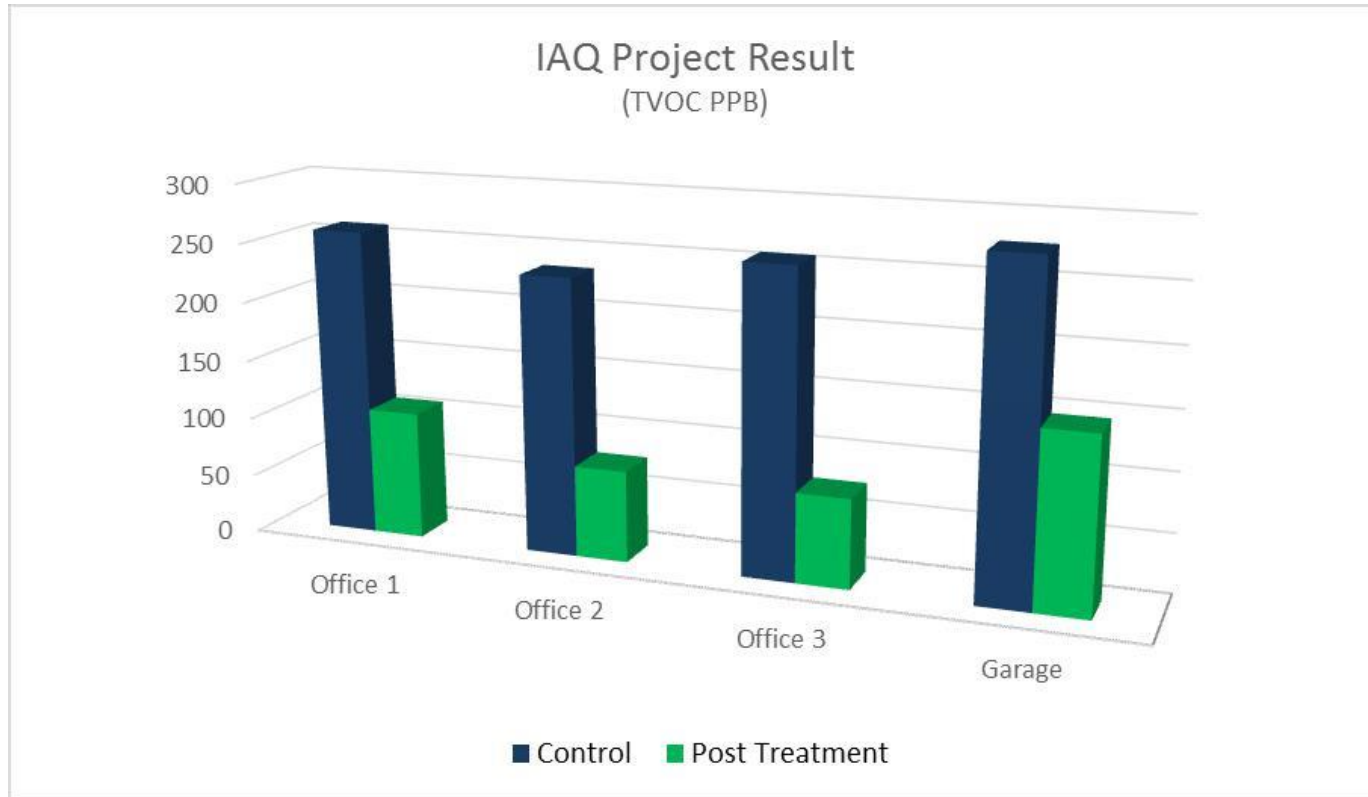
\* Source: Occupational Risk Prevention Organization.

# Smell of tobacco and nicotine in the air



Time From Cigarette Ignition	Nicotine in Nanograms per cubic meter		3 - Ethenylpyridine in Nanograms per cubic meter	
	Uncoated Sample	pureti	Uncoated Sample	pureti
20 min	436,000	72,000	137,000	57,300
12 hours	8,060	<6,060	16,900	<6,060
24 hours	4,870	<4,500	12,700	<4,500
36 hours	3,200	<2,270	10,200	<2,270
48 hours	2,900	<1,520	7,970	<1,520
72 hours	2,170	<1,140	6,830	<1,140
96 hours	1,710	<830	5,310	<830

# Destroys Volatile Organic Compounds



Applying it to the indoor windows of this office building with LEED certification reduced the levels of TVOC by 60%.



# Hotels: Improved Indoor Air Quality

**Success story:** A Spanish hotel with problems of mold and smoke odors in its rooms.

Room Number 121	June 2013	Jan. 2014
123 used as control	Control	PURETi
Measurement:	TVOCs ppb	TVOCs ppb
Location		
Outdoors	0	0
Nightstand	257	58
Indoor sliding doors	254	53
Headboard	251	56
Sink	254	56
Odor notes	Smoke	Fresh
	% Reduction:	78%



# Hotels: Improved Indoor Air Quality

**Success story:** A Spanish hotel with problems of mold and smoke odors in its rooms.



**Behind the beds**



**Behind the paintings**





# Key Benefits: Quality of life

- No more respiration of organic chemical products as they were replaced with water-based (98%) and inorganic-mineral based (2%) products.
- A drop in airborne disease transmission (90%).\*
- The destruction of allergens and VOC's in the air (80%).
- Easier glass cleaning, which reduces occupational fatigue.
- Less risk when cleaning glass in difficult to reach areas.
- Awareness of the risks.

\* Source: Occupational Risk Prevention Organization.

30% of the population suffers from  
respiratory diseases or allergies



**Indoor Air  
Quality is 8  
times worse  
than outdoors**

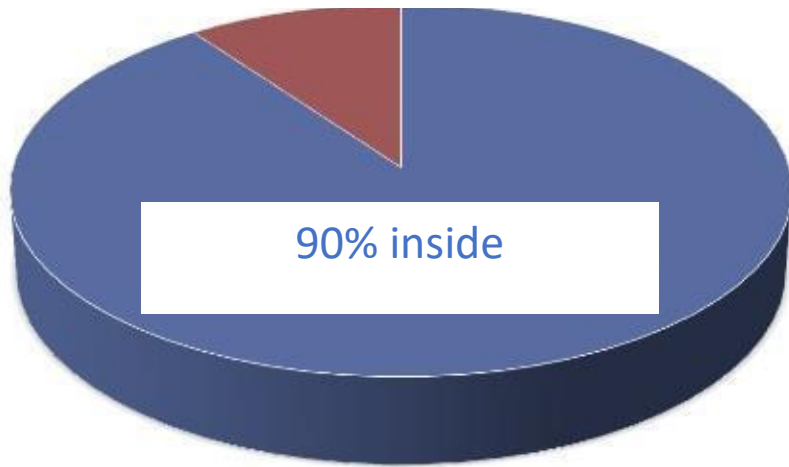
**pureti**

# Indoor Air Quality

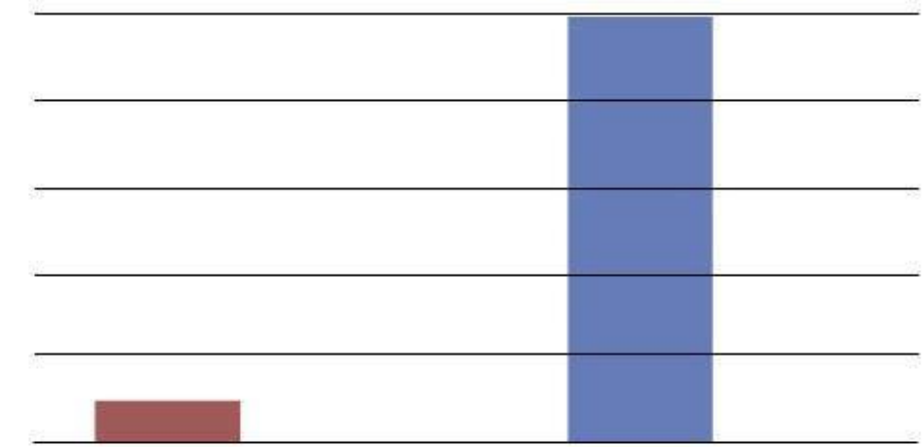
10% in the open air

90% inside

EXPOSURE



5-10X



Open air pollution

Indoor air pollution

# Health impact of VOC's (Volatile Organic Compounds)

- Irritation in the eyes, nose and throat.
- Headaches.
- Loss of coordination.
- Nausea.
- Damage to the liver, kidneys and central nervous system.
- Some volatile organic compounds can cause cancer in animals and some are thought to cause cancer in people.

# Impact of poor indoor air quality in buildings

- Less disease is spread, reducing contagion by 25%.  
*Source: Occupational Risk Prevention Organization.*
- It has been proven without a doubt that poor indoor air quality in offices can reduce productivity as well as bother visitors to your business. Irritation in the eyes, nose and throat.
- Improved job performance and satisfaction at offices, reaching 6.9% - the highest value obtained in field work validation studies. *Source: Wyon DP. Indoor Air. 2004; 14 Suppl 7:92-101. PMID: 5330777.*

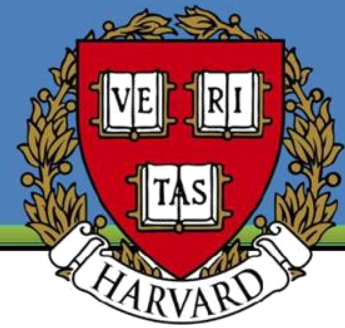
**In general, it is more efficient to eliminate the sources of pollution than increase the rate of outdoor air supply as it saves energy.**



# Common sources of VOC's

- Emissions from office appliances.
- Emissions from stored chemical products.
- Emissions from rugs, furniture, fabrics and varnishes.
- Emissions from special use areas such as laboratories, printing rooms, smoking rooms, food preparation areas.
- Emissions from construction work indoors (VOCs from the use of paints, putty, adhesives and other products).
- Elevator motors.
- Emissions from cleaning.
- The use of deodorizers, fragrances and air fresheners.
- Emissions from the use of pesticides inside the building.
- Accidents such as spills inside the building.
- Emissions from trash stored inside the building.

# A Harvard University study

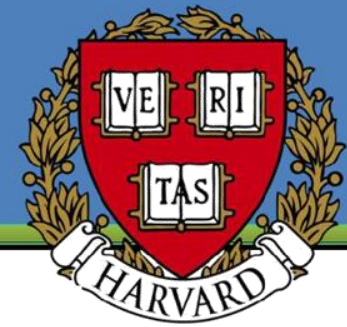


The Harvard T.H. Chan School of Public Health recently reported its conclusions on the harmful effects of the air in offices as concerns levels of CO<sub>2</sub>, lack of ventilation and chemical emissions from the products and objects that surround us with Volatile Organic Compounds.

- There is a 60% cognitive difference among employees in “green” buildings in comparison to those in traditional buildings
- There is a 101% cognitive difference among employees in “green+” buildings in comparison to those in traditional buildings
- The crisis response capacity is 97% better in “green” buildings and 131% better in “green+” buildings.
- Strategic capacity (183% and 288% better).
- The use of information (172% and 299% better).

<http://dx.doi.org/10.1289/ehp.1510037>

# A Harvard University study

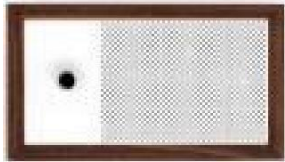


Findings from the Harvard University study on cognitive performance among workers in office buildings due to air quality



Source: *Environmental Health Perspectives* <http://ehp.niehs.nih.gov/wp-content/uploads/124/6/ehp.1510037.alt.pdf>

# Social awareness: Air quality monitors Indoors



Awair



Corvus IAQ Monitor



Blueair Aware™



Canary™



foobot™



speck™



Withings  
TM



# More affordable all the time: One example: Foobot

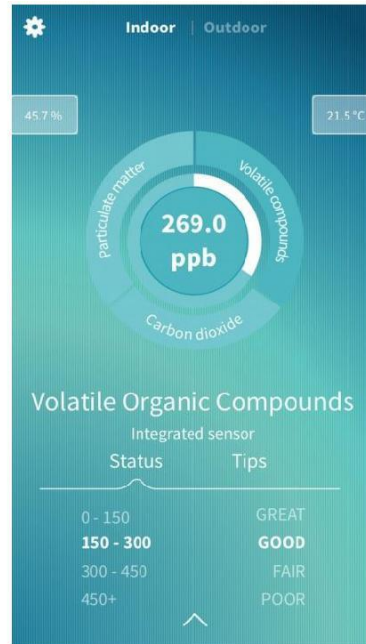




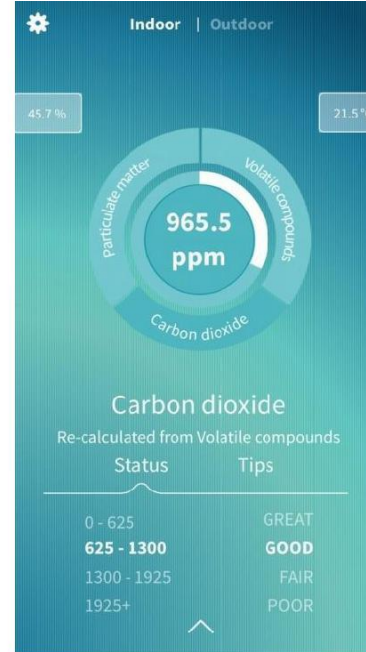
# Indoor Air Quality Measurement: App



Main screen of the App which indicates the Suspended particles up to 2.5 ppb.



Here you can see the VOC's, Volatile organic compounds.

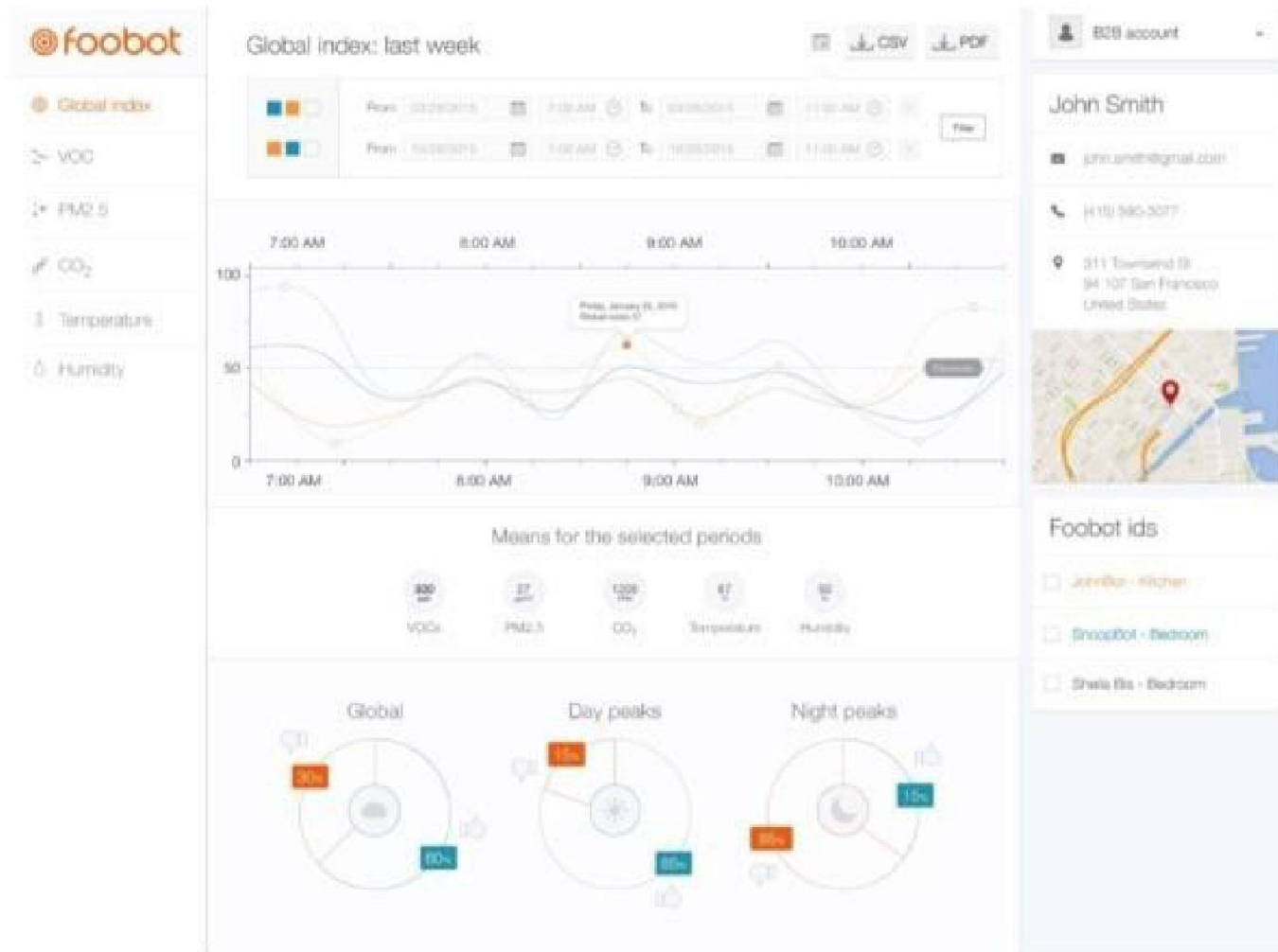


This screen shows CO2, Carbon dioxide.



The device changes color just like the PC screen indicating that despite the fact that the ppm is correct, the VOC's and CO2 are within the limits.

# Indoor Air Quality Measurement: PC



# Indoor Air Quality Measurement: PC



Global Index 2016-04-13 to 2016-05-13



Global Index

From 4/13/16 10:01 AM To 5/13/16 10:01 AM

FILTER

VOC

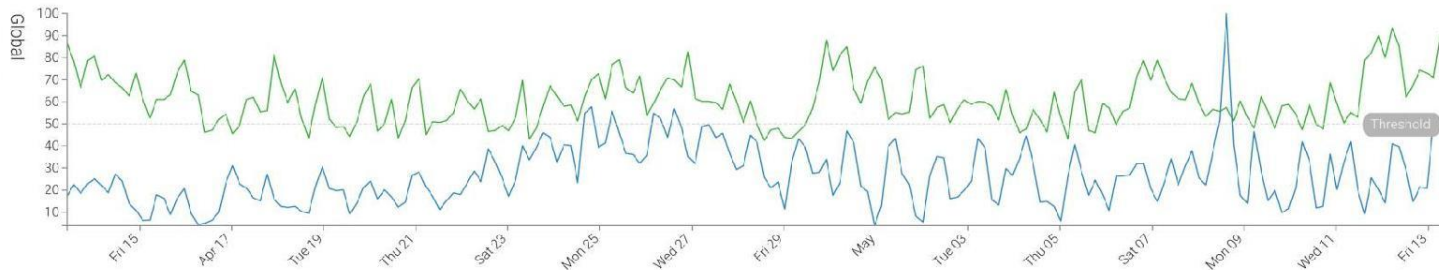
COMPARE WITH ANOTHER PERIOD

PM2.5

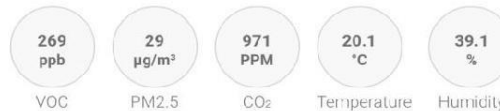
CO<sub>2</sub>

Temperature

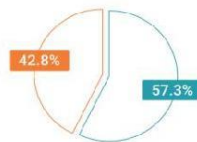
Humidity



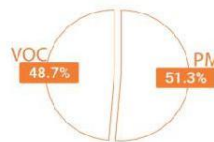
Average values



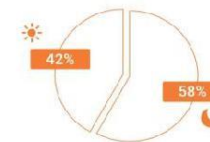
Air Quality



Air pollution



Pollution peaks



Good Bad

TEST-15-FOOBOTS@FOOB...

JC B

test-15-foobots@foobot.io

0545545454

9 Avenue des Hauts  
Fourneaux  
Esch-Sur-Azette 4362  
Luxembourg



FOOBOTS IDS

- Aaron the Airbot - kitchen
- HappyBot - kitchen
- IndyBot - kitchen
- Happybot - kitchen
- Foobot Tanaka-Dunn - kitchen
- Air-monitor - kitchen
- Foobot - kitchen
- AC Bot - kitchen
- King Tutankhamun - kitchen
- FreshAir? - kitchen
- Qbot - kitchen
- aware-y - kitchen



# Indoor Air Quality Measurement

There will be one in each office/home...The price is a real bargain, but the value for people's health is immense... PURE AIR or STALE AIR?



# Air fresheners: Although prohibited, they continue to be used

Public consultation on the restriction of 1,4-dichlorobenzene.

- At the request of the European Commission, ECHA submitted a report proposing a restriction on the distribution and use of air fresheners and tabs to deodorize and disinfect public and household toilets containing 1,4-dichlorobenzene due to the carcinogenic effects. More information at:
- <http://www.boe.es/buscar/doc.php?id=DOUE-L-2014-80943# analisis>
- <http://echa.europa.eu/web/guest/restrictions-under-consideration>
- <http://www.abc.es/sociedad/20140612/abci-ambientadores-sustancias-peligros-as-congreso-201406112219.html>



# Hidden venom:

## 1. Air fresheners



- Despite their widespread use, they are prohibited in the EU in schools, residences and hospitals.
- The photo shows an analyzer close to a scented air freshener. It turns orange which proves the terrible air quality and toxic components which are measured in the App.

# Hidden venom: 2. Cleaning products

ENTREVISTA

ANA MACPHERSON  
Barcelona

La asturiana María Neira dirige el departamento de Salud Pública y Medio Ambiente de la Organización Mundial de la Salud (OMS). Ahora se concentra en demostrar y explicar las decisiones políticas que ahorrarían 13 millones de muertes, sobre todo por contaminación del aire. Antes se ocupó también en la OMS del cólera y de las enfermedades transmisibles. En España creó la Agencia Española de Seguridad Alimentaria en el 2002. Pero sus comienzos fueron sobre el terreno, como médico de MSP en diversas catástrofes. "Entonces estaba con las manos en la masa y me sentía que podíamos con todo y eso bastaba. Ahora participo en la planificación que hace posible las soluciones". Ha estado en Barcelona en un debate sobre salud y medio ambiente organizado por la Caixa y el Ateneu.

## “Abra el armario y reduzca al 10% los productos de limpieza”

María Neira, directora de Salud Pública y Medio Ambiente de la OMS



La experta en salud y medio ambiente de la OMS, en Barcelona

“¿Por qué cuando tenemos una oportunidad estratégica de tomar decisiones que van a mejorar salud, economía y bienestar dejamos escapar esa oportunidad? Estoy hablando de los 13 millones de muertes que hay cada año relacionadas con la exposición a riesgos ambientales que podríamos evitar. Sólo la contaminación del aire provoca 7 millones de muertes evitables”.

Dígame usted por qué. Estamos jugando en el equipo equivocado. Estamos jugando contra el medio ambiente contaminando, utilizando de forma excesiva los recursos. Deberíamos jugar en el equipo del medio ambiente y ahí tendríamos mejores beneficios.

¿Cómo imagina jugar en el otro lado? Nos podríamos a gestionar los recursos, a no generar tantos residuos todos los días, a usar la energía de una forma más limpia. No moveríamos de una forma más eficaz, con un diseño de ciudades en nuestro beneficio y no en contra. Hay desarrollo tecnológico sin

destruir el medio ambiente y la salud. Lo que están haciendo China o India no es lo único posible. Mire los países nórdicos. Londres era irrespirable en el XIX y hoy está limpio y son mucho más ricos. El problema es que no nos lo acabamos de creer. Seguimos viendo un modelo sostenible como algo idealista simpático y poco eficaz. Y no es verdad. Tratamos que identificar ese beneficio y promoverlo. La gente tiene que saber que las decisiones ambientales tienen un impacto directo en su salud.

¿Prohibir los coches diésel? No se trata de decisiones aisladas,

hay los coches diésel, mañana otra cosa, sino de una planificación, de un cambio de modelo de vida en el que también cada uno contribuye, siendo consciente de qué energía consume, de los excesos y los abusos. No hablo de perder bienestar, sino de problemas de salud evitables.

¿Problemas a largo plazo? No, no, de forma inmediata. Las decisiones que tomamos para reducir los gases de efecto invernadero van a incidir en el asma, las alergias o los accidentes cerebrovasculares que ya cuestan enormes cantidades de dinero. En Pekín ya hay manifestaciones en

la calle por la calidad del aire. La gente ha entendido perfectamente que lo de la mascarilla no es solución, que siguen tosiendo.

¿Hay un punto de inflexión para que esa política simpática e idealista se convirtiera en una demanda mayoritaria?

Ese día es el que buscamos. Pero estoy convencida de que ese cambio se producirá el día que la ciudadanía entienda que incendiar su bombilla tiene relación con el asma de su niño. Ese día será más exigente, el día que entienda la conexión entre salud y medio ambiente. El día que se entienda que el cielo está oscuro porque

hay contaminación y que está afectando no al planeta sino a fin pulmones.

¿Qué papel tienen ustedes, la OMS, en este objetivo? Tenemos que generar la evidencia y divulgar esta información, y trabajar con los gobiernos, estar allí cuando Nigeria decide el tipo de energía por la que apuesta, por que es una decisión de salud.

Y a España qué le dicen cuando decide dificultar el uso de las energías limpias? En Filipinas, por ejemplo, hemos estado presionando en el diseño de la movilidad. En Asia se están construyendo carreteras enormes para llevarlas de coches. El día 27 publicaremos el informe detallado, país por país, de las muertes relacionadas con la calidad del aire. Molestará.

¿Y yo qué puedo hacer?

**DISRUPTORES ENDOCRINOS**  
“El riesgo está en la mezcla de productos; sólo vemos la punta del iceberg del problema”

**PREVENCIÓN POSIBLE**  
“Cada año hay 13 millones de muertes por la exposición a riesgos ambientales”

Para empezar, saber que las decisiones políticas sobre la calidad del aire inciden directamente en mi asma, en mi riesgo cardiovascular, en los lectos. Además, cada uno puede usar más transporte público para que haya menos partículas, producir menos residuos, reciclar y, muy importante, revisar el armario de productos de limpieza, desde los químicos de casa. Reducirlos al 10%. Cada uno por su lado no es un riesgo. Combinados, sí. Los problemas de los disruptores endocrinos sólo están aumentando: vemos la punta del iceberg. Así que mejor que vayamos actuando ya con sentido común.

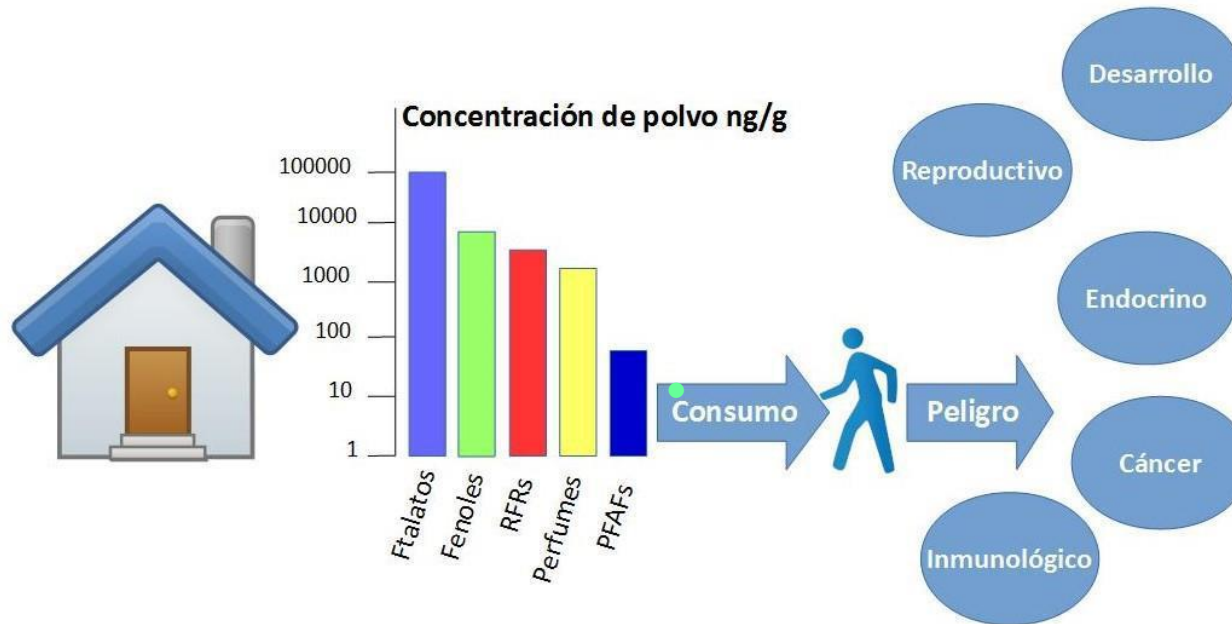
“Reduce cleaning products by 10%, which pose a risk when combined.”

María Neira, WHO Director of Public Health and the Environment Department.

Cleaning products are sources of VOC's which cause various diseases and they can now be measured with air quality measuring more and more affordable all the time.

# Hidden venom:

## 2. Cleaning products



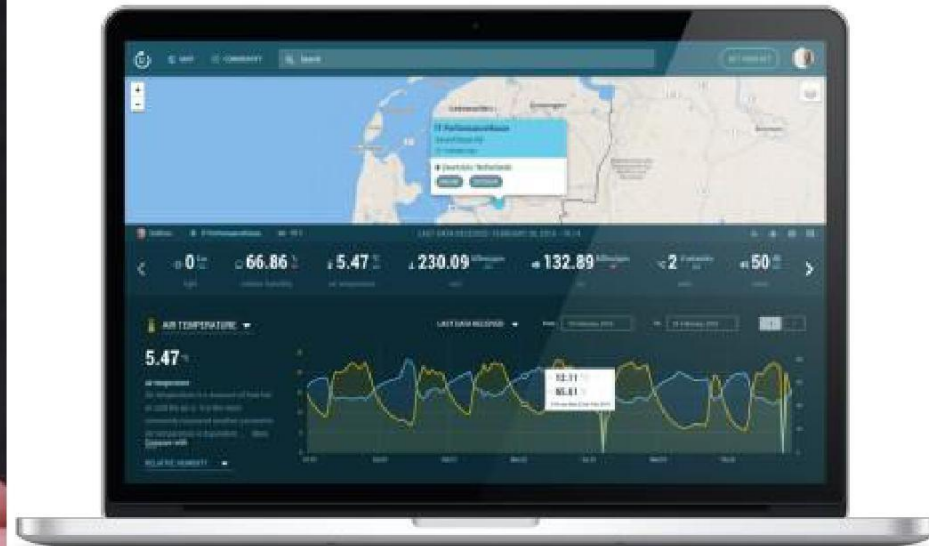
Thus is proven by the study\*:

” [Chemical products in indoor dust: A qualitative meta-analysis of studies in the United States](#)” at [George Washington University](#) has detected 45 potentially toxic chemicals in the dust left by the products we use each day to clean floors and furniture and for personal toiletries, etc. Ten of the most toxic products have been identified in 90% of the dust samples, including the most common one, found in 100% of the samples. It was Bis(2-ethylhexyl) phthalate (DEHP), which is frequently used in plastic packaging and toothbrushes.

\*Source: <http://pubs.acs.org/doi/abs/10.1021/acs.est.6b02023>



# Smart Citizen



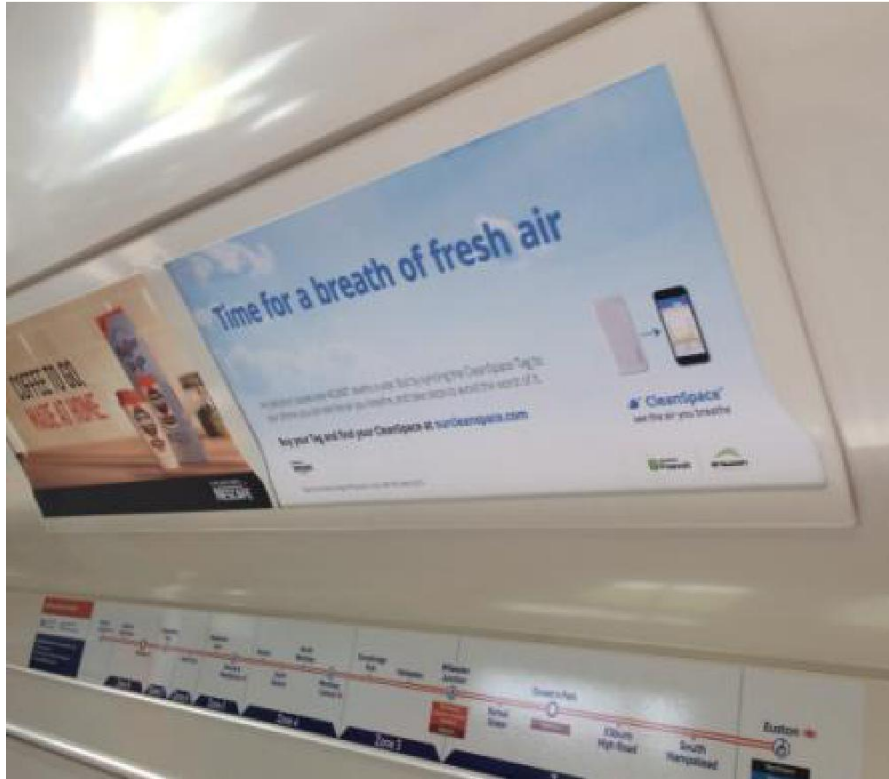
Pocket indoor air quality  
measuring devices

<https://smartcitizen.me/>

And they're now available for mass consumption...

Social awareness on pollution

Ads for portable air quality measuring devices



**Time for a breath of fresh air**  
London Underground April 2016



The prices of air quality sensors have dropped 100% per year and the capabilities have multiplied



London Underground in June 2016 People are reminded of the new mayor's electoral promise to reduce pollution in the city

# NO CHEMICALS – NO ENERGY COMSUMPTION!!!!

Based on a  $\text{TiO}_2$  mineral product and 98% water in a mechanical process



Thank you for your attention!

**pureti**