http://www.eco-business.com/news/a-burning-smell-this-device-can-detect-air-pollution-in-real-time/

A burning smell? This device can detect air pollution in real time

With the haze season now underway in Southeast Asia, there's now a technology that can detect air pollution quickly and accurately.

Brought to you by: HORIBA

By Jianyue Xue

Friday 18 August 2017



Orchard Road in Singapore during the record 2015 Southeast Asian haze. By Nick-D - Own work via Wikimedia Commons, CC BY-SA 4.0

Southeast Asians are no strangers to the effects of air pollution. Many across the region painfully recall the haze that has periodically, over decades, blanketed the lands of Indonesia, Malaysia, Singapore and Brunei with smog.

The haze crisis of 2015 was the worst in recent memory. Thousands in the Indonesian province of Riau alone were hit with respiratory infections. Schools were shut, outdoor activities were reduced and a few children's lives were even lost due to the pollution.

CARBON & CLIMATE
Laser radar to help cities combat smog
Read now

The causes of the haze are well understood. Slash-and-burn agriculture across vast swathes of Indonesia during the dry season has led to uncontrollable forest fires releasing huge columns of smoke which were even visible from space.

Due to fluctuating wind directions, predicting the air conditions of particular geographical areas proved to be difficult. Governments found it difficult to decide where to prioritise aid, such as masks, medicine and ships for evacuation.

People living near haze hotspots found it hard to determine whether smog was forest fire related, or caused by other pollutants such as vehicle emissions.

The latter, while not as widely publicised as the transboundary haze, is a growing cause for concern across the region as well. According to PwC's automotive analyst group, Autofacts, Southeast Asia is an expanding market for automotives, buoyed by a growing middle class that is expected to more than double to 400 million by 2020.

A 2016 study by Erik Velasco from the Singapore-MIT Alliance for Research and Technology warned that tiny particles from vehicle emissions are smaller and more toxic than the PM2.5 pollutants that are dominant during periods of haze.

Southeast Asia's use of coal – a highly pollutive fuel – is also increasing thanks to its abundance, relative affordability and the need to provide energy for 120 million people who live without electricity.

According to the World Health Organisation (WHO), outdoor air pollution kills more than three million each year, more than malaria and AIDS. Already the single biggest killer in the world, outdoor air pollution is expected to double its toll as urban populations increase and car numbers approach two billion by 2050.

The WHO warned that air pollutants such as sulphates, nitrates and black carbon can penetrate deep into the lungs and into the cardiovascular system, posing the greatest risks to human health. WHO assistant director general Flavia Bustreo says the risk of stroke, heart disease, lung cancer, and chronic and acute respiratory diseases will rise as urban air quality declines.

A swifter and more accurate monitoring system

To address the diverse origins of air pollution and its detrimental effects on health, Japanese manufacturer Horiba developed a powerful air pollution monitor, called the PX-375, in 2014.

The 40-kg device, currently used in Japan, China and Singapore, is among the swiftest analysers of PM2.5 particles in the market today. PM2.5 particles are pollutants that, at 2.5 micrometers or less in diameter, could be drawn deep into the lungs.

Unlike previous PM2.5 measurement practices where analyses required manual sampling followed by lab analysis, the PX-375 is capable of automatic, continuous measurement and analysis. The device determines the mass of particles through the amount of beta rays it absorbs.

The PX-375 could be useful in densely populated areas vulnerable to sudden and damaging onsets of haze. Since 2013, the Singapore government has been trying to develop a better early warning system for haze to avoid "getting caught by surprise". Better early warning systems could, for example, help with the early distribution of marks and rescheduling of certain outdoor activities.

Besides detecting pollutants brought about by the haze, the PX-375 is also capable of detecting a range of industrial pollutants such as lead, cadmium, mercury, chromium, arsenic, and antimony.

According to WHO, cadmium, lead and mercury are common air pollutants, being emitted mainly as a result of various industrial activities. Cadmium exposures have been known to cause kidney and bone damage. As for lead exposures, exposure to the element can lead to developmental problems in fetuses and children.

Horiba spokesperson Johnson Khor says: "Heavy metal elements are toxic air pollutants harmful to human health. Severe pollution due to toxic heavy metal emissions must be addressed quickly."

"Most conventional air monitoring methods require field sampling and lab analysis. This process may need two to three days to generate the results. With the PX-375 online dust monitor analyser, the results can be generated within two hours on site, and then continually measured at hourly intervals."

Up to 75 elements can be detected by the PX-375 and that comprises six out of 10 known elements on Earth. The device is also able to measure up to 15 elements.

Heavy metal elements in the air are currently being monitored by ambient air quality monitoring systems, says Khor. The PX-375 can be integrated into these existing systems, located within mining, shipyard, and cement industries, he added.

Differentiating foreign and domestic sources of pollution

Horiba's PX-375 can help governments differentiate between smoke related to forest fires, vehicle exhaust emissions or coal-related emissions. Using X-ray radiation, the PX-375 is able to produce a breakdown of elements present within polluted air, providing clues about the smog's source.

According to Rajasekhar Bala, an environmental engineering expert at the National University of Singapore, the ability of the PX-375 to identify pollution sources quickly can provide valuable data for developing environmental policies.

Pollution sources could have originated from different cities and from different activities, such as road vehicles, industries, and waste incinerators.

Bala says: "Air pollution is influenced by weather conditions such as wind direction and speed, which constantly change over time. By putting data on trace elements and airborne particles together and analysing them statistically, it is possible to identify potential sources of airborne particles by using trace elements as 'chemical fingerprints'."

Southeast Asia is affected by air pollution that can spread between cities and within cities. Therefore, "chemical fingerprints" determined by the PX-375 can determine how much the transboundary haze is contributing to air pollution compared to domestic emissions, says Bala.

Share this story

Topics: Carbon & Climate, Cities, Policy & Finance
Regions: Asia Pacific
Tags: metering, pollution

Comments for this thread are now closed.

1 Comment Eco-Business Login

Recommend Share Sort by Best

Mickey Mao • a month ago
"Already the single biggest killer in the world, outdoor air pollution is expected to double its toll "
what complete bullshit
The biggest preventable killer in the world is tobacco smoke which , on the WHO website, is shown to kill 7m persons per year
Share ›

Subscribe | Add Disqus to your site | Privacy DISQUS

Most popular



GREEN BUILDINGS
When sustainability saved the city



LIFESTYLE
What we know—and need to know—about sustainable fashion



FOOD & AGRICULTURE
Palm oil giant FGV: We will 'endeavor to rehabilitate' peatlands in Borneo

View all news

Industry Spotlight



ENERGY
Bringing Asia together to solve common energy challenges



CARBON & CLIMATE
A burning smell? This device can detect air pollution in real time



FOOD & AGRICULTURE
What's the sustainability story inside our food?

View all

Feature Series



INTERNATIONAL GREEN BUILDING CONFERENCE 2017
Building the world's greenest city



EDUCATING TOMORROW'S LEADERS
Sustainability research that aims to change the world



ECOSPERITY 2017: TOMORROW STARTS TODAY
3 firms winning in Singapore's sustainable business space

View all

Featured Events

SEP 19 — SINGAPORE — Asia Sustainability Reporting Summit 2017

SEP 25 — NETHERLANDS — 33rd European Photovoltaic Solar Energy Conference and Exhibition (EU PVSEC 2017)

SEP 25 — UNITED ARAB EMIRATES — Electric Vehicles UAE

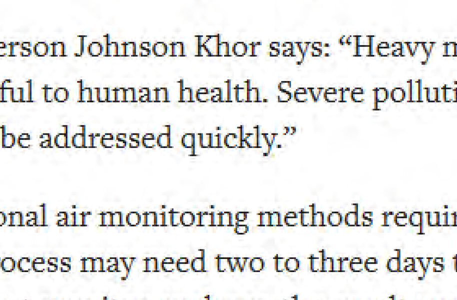
SEP 28 — SINGAPORE — Unlocking Solar Capital Asia

OCT 11 — AUSTRALIA — All-Energy Australia

View all | Add an Event

Related Stories

CARBON & CLIMATE
New PSI reporting system to see more days with 'moderate' air quality
12 Mar 2014 News



WATER
Horiba: Helping to keep Southeast Asia's waters clean
22 Jul 2016 News

CARBON & CLIMATE
Haze in S'pore reaches hazardous level, businesses affected
20 Jun 2013 News

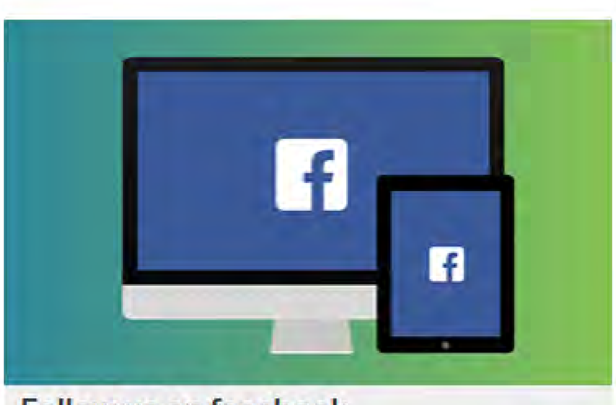
CITIES
Singapore: Fine particles a growing concern though air pollution 'in good range'
30 Dec 2010 News

The SDG Co — Asia Pacific's Hub For Collaboration On Sustainable Development — An Eco-Business initiative

Subscribe



Subscribe to our newsletters
The best Eco-Business stories, jobs and events delivered to your inbox – daily or weekly.
Subscribe



Follow us on facebook
Read our stories and particpate in the Eco-Business facebook group.
Follow

© Eco-Business 2009—2017