Mastering Mobility: Integrating air quality into sustainable mobility planning

November 23rd | 10:00-11:30 CET

Mobilise Your City

Welcome to this year's Mastering Mobility Series!

- ✓ Learn
- ✓ Exchange
- ✓ Connect

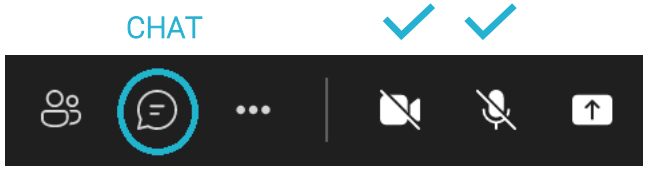
02.11.2021	Data types and data collection methods for an urban mobility diagnosis
10.11.2021	Tramways as sustainable mass-transit systems: Ex-post evaluation of Moroccan tramways
16.11.2021	Understanding air quality and its role in urban transportation
23.11.2021	**Integrating air quality into sustainable mobility planning**
29.11.2021	Reforming paratransit with MobiliseYourCity's newest catalogue of measures
30.11.2021	Getting to know your potential: Conduct a financial assessment of your city
07.12.2021	Reflecting about barriers and co-creating solutions for active and walkable cities

Translation French-English will be provided

Mobilise Your City

Some general notes on this session

Make sure you are muted and your camera is turned off



This session will be recorded. You will not appear in the recording if your camera is kept off

Include your questions in the chat, we will pose them in the Q&A at the end of the session

Translation to English available!

That's how it works before the session starts:

- Go to **the App Store** of your phone (iOs or Android) and download the **Ablio Audience App**
  - Google Play Store: click here
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- Select the language channel you wish to listen to

That's how it works during the session:

- Use the **computer speakers** for listening to the **audio of the video conference**
- Use your **smartphone with Ablio Audience App and headsets** for listening to the translation
- Unmute the microphone of your computer when you are **speaking in your preferred language**.
- If there is **an increasing delay** during the meeting, **tap the translation channel** (close and reopen it) to clear it.

Agenda

10:00	Introduction to today's session Vincent Larondelle
10:05	Vision, scenarios and measures Anne Chaussavoine
10:15	Case studies: FASEP Hanoi, Southern Asia projects and FASEP Dakar Stéphane Carcas
10:35	Poll Vincent Larondelle
10:40	Monitoring air quality Marie-Pierre Meillan
10:50	Case study: Mitigation measures developed in Paris agglomeration Juliette Laurent
11:05	Q&A Vincent Larondelle
11:15	Wrap-up, participant feedback Vincent Larondelle

Mastering Mobility Series

Mobilise Your City

Objectives of the session

- Identify the main stakeholders to be involved in the planning process to effectively address air quality
- Identify measures to improve air quality from the urban transport sector
- Learn how to establish monitoring and evaluation systems for air quality

Meet the speakers and facilitators of today's session

Speaker
Anne Chaussavoine
Transport team leader
Agence Française de Développement

Speaker
Juliette Laurent
Partnerships and International Relations Coordinator
Airparif

Speaker
Marie-Pierre Meillan
International project officer at European and International Division
Ademe

Speaker
Stéphane Carcas
Deputy head transport and mobility division
Agence Française de Développement

Moderator
Vincent Larondelle
Monitoring and evaluation
MobiliseYourCity

Mobilise Your City

Integrating air quality into sustainable urban mobility planning and investments

Vision and strategies for urban transport in a global Air Quality public policy – Air quality and Climate – Short & long term actions.

***MYC Webinar*, 23.11.2021**

Anne CHAUSSAVOINE, Project manager, AFD Paris, Division Mobilité Transports

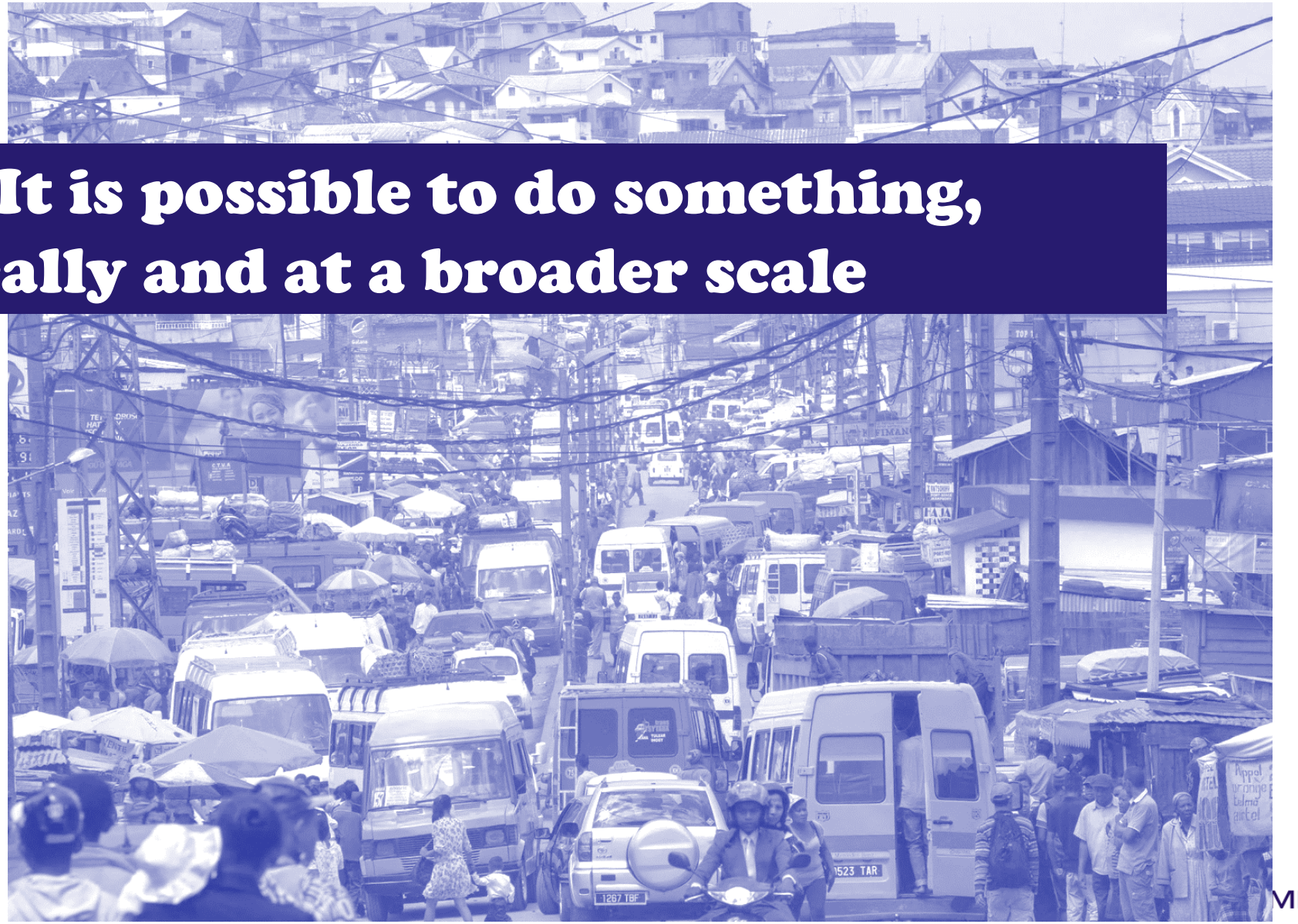
source: vietnamnet.vn, 10/2016

CONTENTS

A. It is possible to do something, locally and at a broader scale

B. How to intervene in (urban) transport for improving air quality?

A. It is possible to do something, locally and at a broader scale



Air pollution: some key figures and trends

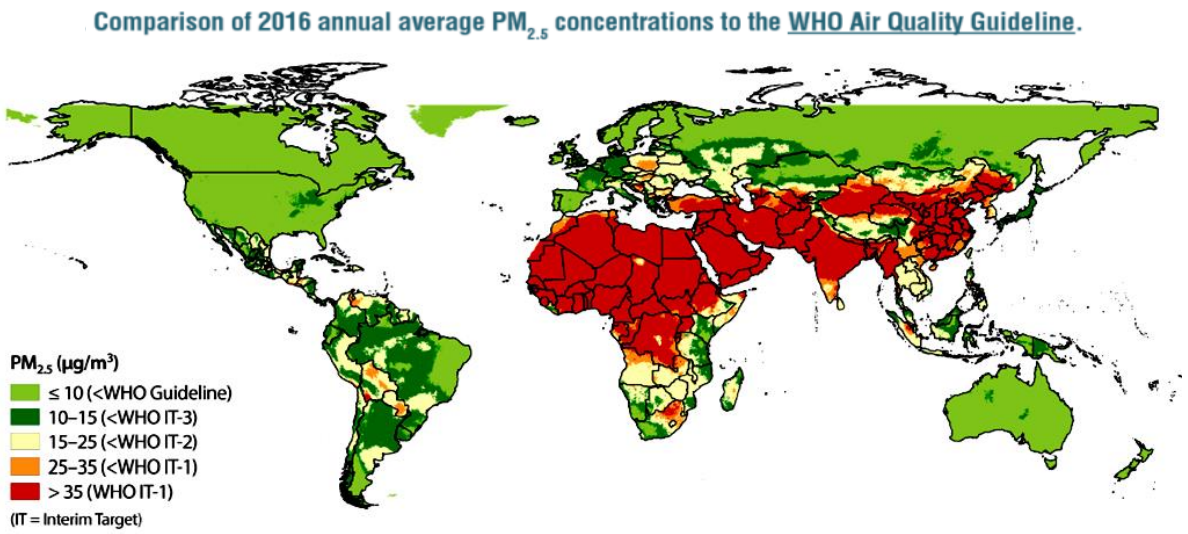
A GLOBAL PHENOMENON…

92%
of the world's population is exposed to air pollution

85%
live in areas with PM2.5 > lowest WHO threshold ;
60% > critical threshold

98%
of cities > 100,000 inhabitants in DCs do not meet WHO thresholds

source : WHO



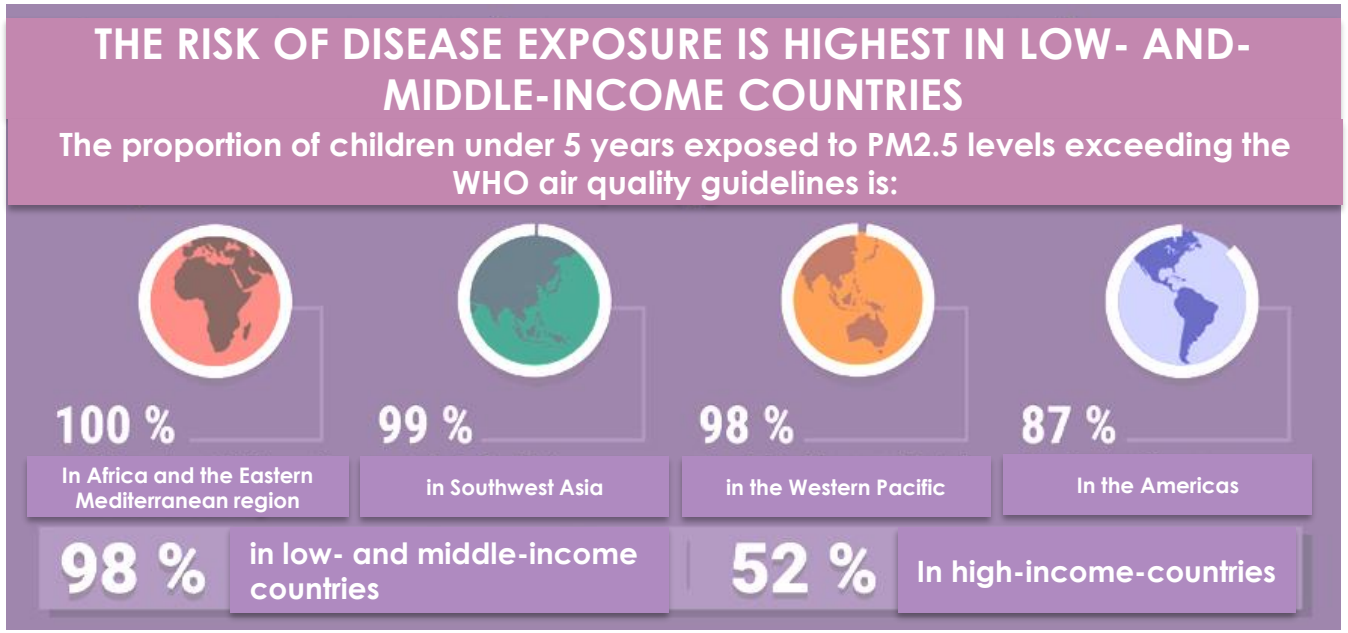
source : State of global air, 2018

- **Asia** is the most affected continent
- **Africa** is experiencing a significant deterioration of air quality
- **Urban AND rural areas** affected

Air pollution: some key figures and trends

… GENERATING INEQUALITIES: THE MOST VULNERABLE PEOPLE ARE AFFECTED …

- The consequences are depending on the level of development: 90% of deaths occur in middle- and low-income countries
- And particularly affect the most vulnerable populations: children and elderly, women, outdoor workers.

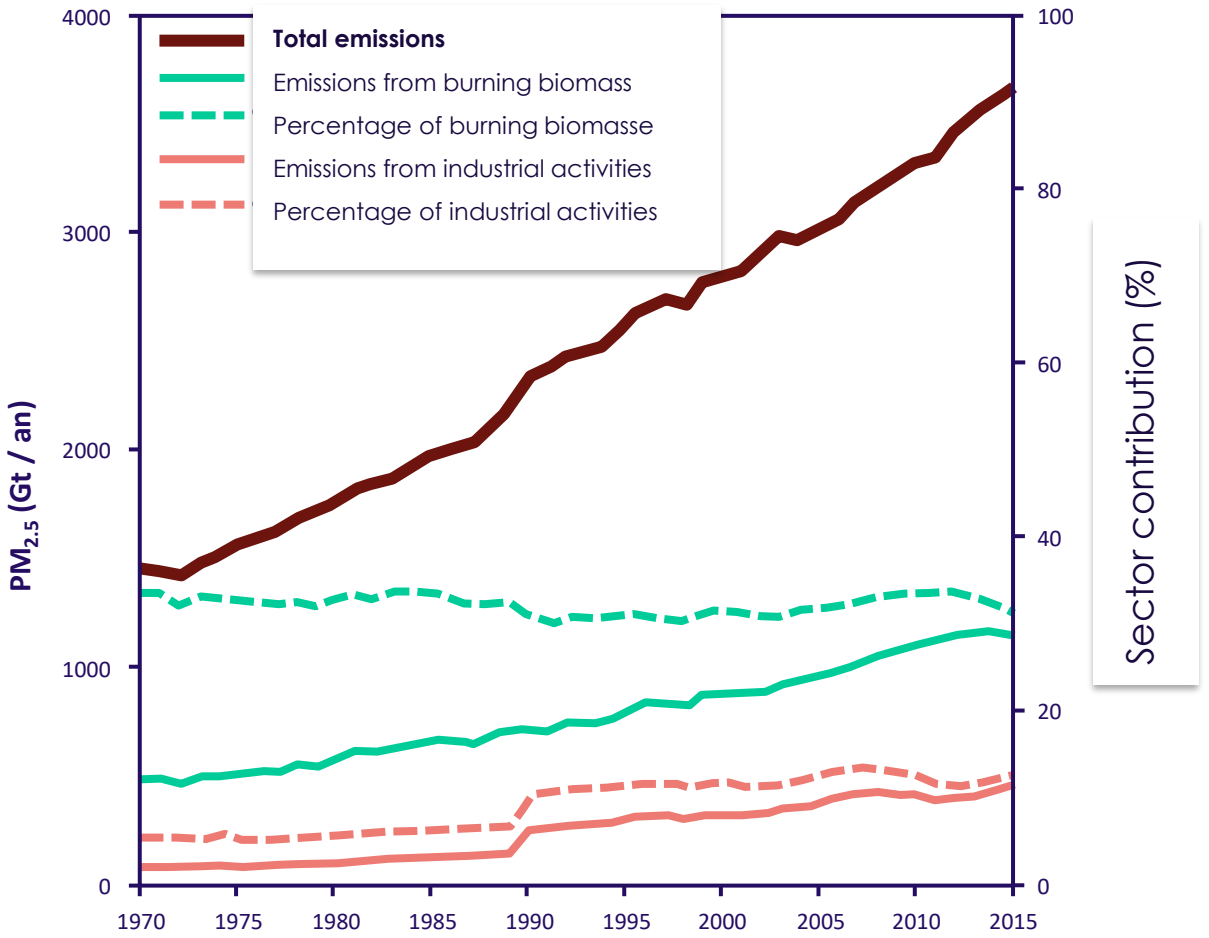


Air pollution: some key figures and trends

… A PHENOMENON THAT IS WORSENING GLOBALLY…

Trends in South-East Asia

PM2.5 emissions driven by urban and industrial activities



source : Airparif, 2021

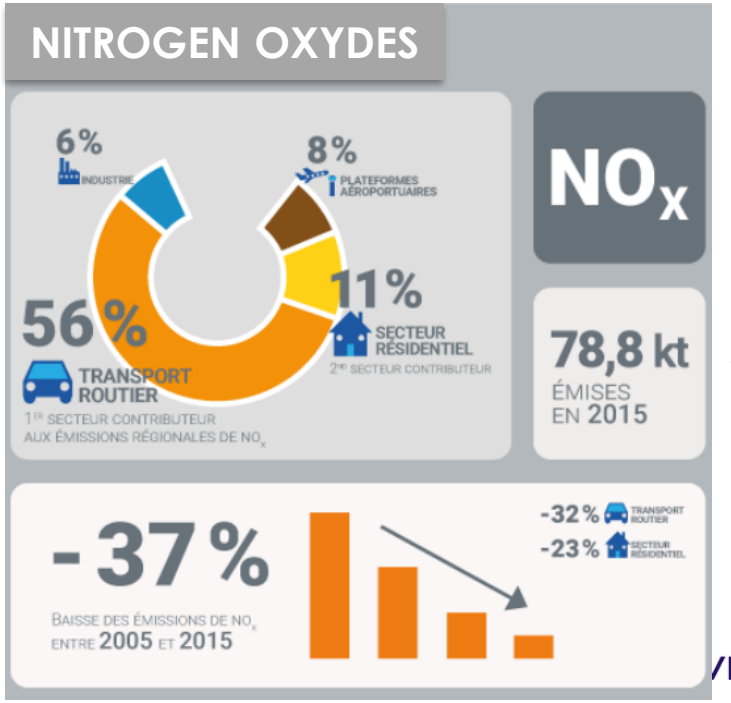
Air pollution: some key figures and trends

… BUT WE CAN DO SOMETHING!: POSITIVE EVOLUTIONS IN CITIES THAT ARE COMMITTED

-33%
for PM2.5 in 74 cities in **China** from 2013-2017

source : IQAir, 2021

Ile de France (Paris region): decrease of pollutants from 2005-2015



source : Airparif, inventaire des émissions, 2015

Air pollution: a phenomenon on local and global level

IMPACTS AND SOLUTIONS ARE AT LOCAL AND GLOBAL SCALES

- **REGARDING IMPACTS** :

Pollution certainly has **local** effects, on health, on the environment, on buildings (or even regional if it travels)...

... but also **transregional/transboundary effects** via the dissemination of pollutants

... **but also global effects on the scale of the planet** (ozone is a pollutant and a GHG): air pollution/climate imbrication.

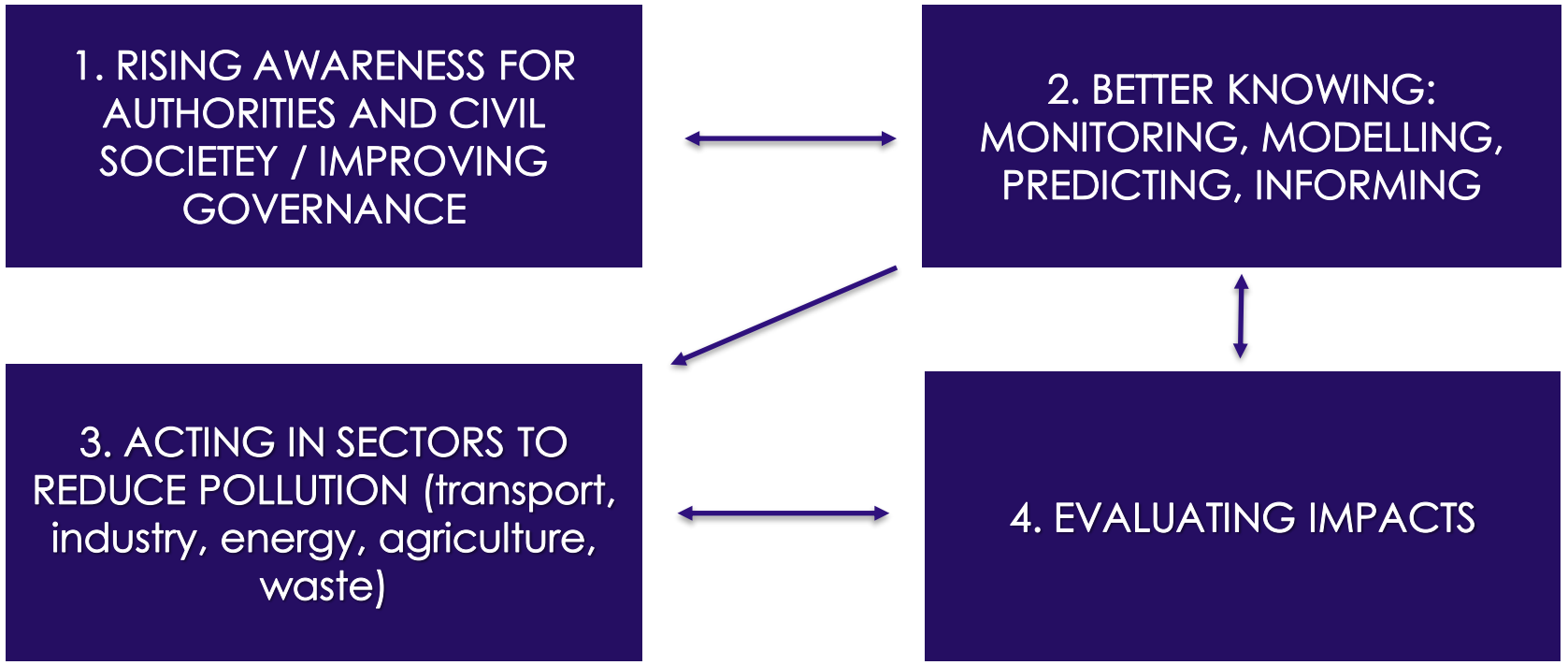
- **REGARDING SOLUTIONS**:

Air pollution has local solutions (e.g. **traffic and speed reduction**, ban on waste and crop burning, etc.) but **also national/regional levels (e.g. Euro norms for vehicles) and at a global level** (WHO thresholds).

B. How to intervene in (urban) transport for improving air quality?

THE FOUR INTEGRATED PILLARS OF A PUBLIC POLICY FOR IMPROVING AIR QUALITY

so that inhabitants can **breathe high quality air**



How to intervene?

PILLAR 1 : RISING AWARENESS / GOVERNANCE

Objective

Rising awareness at political and social levels for authorities and civil society in order to reach a shared vision on the stakes of air quality and to build a sustainable governance of the topic.

Operational actions

Governance

- Integrating AQ in legislation ; National Plan
- Creation and governance of partnership-entities dedicated to AQ
- Sharing a reliable information, accessible and regular

Projects

- Workshops for information, awareness, disseminating knowledge (stakes, causes, financial impacts and costs, existing solutions)
- Car-free days

Studies

- **Preliminary diagnosis on various sectors including transport**, in order to identify stakes, main sources of pollution, existing stakeholders
- Support to AQ dedicated entity

PILLAR 1 : RISING AWARENESS / GOVERNANCE

EXAMPLES

Mexico –Co-financing an AQ workshop by Mario Molina Center with French Airparif and Citepa contributions, 2018 (10 kEUR, AFD Mexico local office)

India – Financing a short-term diagnosis study in India, 2019-2020 (WRI, 25 kEUR, internal MOB budget)

Indonesia – Financing of a macro-economic study for ministry of Planning BAPPENAS on various AQ/Transport scenarios, 2021 (WRI, 300 kEUR):

- Study of scenarios of air pollution and health impacts associated with different CO2 emission trajectories. This includes an assessment of the impacts of a business-as-usual scenario in the transport sector on health and potentially on the country's productivity.
- Further development of the transport sector model in Vision 2045 and establishment of scenarios for the transport sector, identifying co-benefits and necessary investments.
- Support on the methodology of air quality measurement in Indonesia.

How AFD is intervening

PILLAR 2 : GAINING A BETTER UNDERSTANDING: MEASURING, MODELLING, FORECASTING, INFORMING

Objective

Carrying out actions aimed at gaining knowledge on air pollution on the one hand, and disseminating information to the authorities and the public on the other

Operational actions for AFD

Governance

- Creation / mandate / governance / business model (incl. maintenance) of agency(ies) in charge of AQ monitoring
- Creation of urban mobility observatories integrating AQ
- Reporting obligations on pollution sources and levels
- Modalities for sharing information on pollution

Projects

- Financing (a network) of measuring stations (100-150 kEUR/u) and microsensors (10+ kEUR/u)

Studies

- Support for the creation of AQ entities, capacity building, support for data collection and calibration, network maintenance
- Diagnosis of existing equipment and data (reliability)Sizing of a measurement network / support to ad hoc campaigns
- Establishment of an emission inventorySupport for modelling/mapping/forecasting (in conjunction with Météo)
- Support to the information strategy of the authorities / the population

How to intervene?

PILLAR 3 : REDUCING POLLUTION BY ACTING IN SECTORS

Objective **The ultimate goal!**

Define and implement action plans (at appropriate territorial levels) through (multi)sectoral investments and support to public policies

Operational actions

Governance

- Setting of thresholds, reduction targets, monitoring and controls
- **Adoption of standards (vehicles, fuels,** motor oils, etc.), sectoral strategies integrating air quality, improvement of technical control of vehicles

Projects

- **"Avoid" trips:** TOD, reduction of traffic around sensitive generators, reduction of through traffic, reduction of HGV traffic
- **"Shift" trips to less polluting modes:** pedestrianisation, cycling facilities, capacity transport projects (BRT, tramway, metro, etc.), facilities for shared vehicles, etc.
- **"Improve" vehicles to make them less polluting:** fleet renewal, promotion of electric vehicles, low-emission zones, better traffic management/optimisation of speeds, powering of ships at quayside, asphalting of roads, etc.

Studies

- Action plans, Climate-Air-Energy Plans
- **SUMPs integrating AQ**

AIR QUALITY AND CLIMATE: RESPECTIVE IMPACTS OF TRANSPORT ACTIONS ON GHG EMISSIONS AND AQ

Favouring Diesel Vehicles / Petrol Vehicles?

AQ : negative impact

Diesel vehicles without**emit more pollutants, especially PM.**

Those equipped with filters emit a level of PM equivalent to petrol vehicles.

Regarding NOx, diesel vehicles, regardless of the Euro standards, emit significantly more than petrol vehicles in real-life situations.

CO_2 : positive impact

Compared to petrol vehicles, they consume less fuel on average for the same distance and, even if a litre of diesel fuel burnt emits more CO2 on average than a litre of petrol, it is estimated that **diesels emit less CO2 for the same distance travelled.**

It should be noted, however, that the difference in CO2 emissions is small (less than 5-10%?), if not absent. Particulate filters could also increase fuel consumption (by 1 to 4%) and therefore CO2 emissions.

AIR QUALITY AND CLIMATE: RESPECTIVE IMPACTS OF TRANSPORT ACTIONS ON GHG EMISSIONS AND AQ

Electric mobility

AQ : positive impact

QA: Electric vehicles do not emit particles, NOx or VOCs at the exhaust (air pollutants and ozone precursors).
On the other hand, they do emit, as do thermal vehicles, particles linked to the abrasion of brakes (even if, a priori, less braking is done because of the energy recovery system), tyres and the road.
A life-cycle analysis should otherwise focus on the production phase (especially of batteries), the production of electricity, especially of fossil origin, and even the recycling of batteries.

CO2 : overall positive impact

The impact depends on the energy mix used to produce the electricity.

An average electricity emission factor of 550 gCO2/kWh comparable to the world average of 520 gCO2/kWh is required for electric vehicle emissions to deteriorate and be comparable to the CO2 emissions of the combustion vehicle.

The gains in CO2 compared to the diesel equivalent are greater at high intensity of use, including public transport vehicles (equivalent threshold of 700 gCO2/kWh for buses)

AIR QUALITY AND CLIMATE: RESPECTIVE IMPACTS OF TRANSPORT ACTIONS ON GHG EMISSIONS AND AQ

Reducing the sulphur content in fuels.

AQ : positive impact

Lower sulphur levels in fuel result in **lower emissions of the air pollutant sulphur dioxide (SO2)**. In addition, low sulphur content in fuels is necessary for the proper functioning of equipment designed to reduce fine particles and other compounds emitted by vehicle exhausts.

CO_2 : positive impact

The **reduction of soot emissions through the use of low sulphur fuels has a very strong positive impact on climate change** and health (soot is a pollutant and also an important radiative forcer).

Some refining processes lead to increased energy consumption, and therefore CO2 emissions. This must be taken into consideration when desulphurisation techniques are explored.

AIR QUALITY AND CLIMATE: RESPECTIVE IMPACTS OF TRANSPORT ACTIONS ON GHG EMISSIONS AND AQ

Biofuels

AQ : positive impact but varies

Biofuels contribute to the fight against air pollution, **with emissions of air pollutants equal to or lower than those of fossil fuels**.
However, the quantitative effect of biofuels on air pollution varies greatly depending on the type of pollutant, the fuel, the age of the vehicle and the conditions of use or traffic. The benefit of biofuels is greater for older vehicles than for newer ones.

CO_2 : positive impact but varies

First-generation biofuels produced in France (biodiesel and bioethanol) **show more favorable energy and greenhouse gas emission balances in life cycle analysis than the reference fossil fuels** (diesel and petrol).

These gains vary according to the type of biofuel used: a 90% reduction in GHG emissions is shown (compared to diesel) for biodiesels generated from used food oils and animal fats, while a 50% reduction is expected for ethanol produced from wheat and beet.

PILLAR 3 : REDUCING POLLUTION WITH SECTORAL INVESTMENTS

EXAMPLES

Latin America/ Caribbean – **Regional electric mobility programme,** 2022-2027 (710 MEUR, AFD/KFW/GIZ/CAF of which 190 MEUR expected from the Green Fund)

Tunisia – Opportunity and feasibility study for the shore power supply of ships in the port of La Goulette, 2020-2021 (Cap Ingelec, 200 kEUR) - see Project Sheet

Southeast Asia – Regional Air Quality Programme, 2020-2022+ - **see separate presentation**

Vietnam – Multi-sectoral TA City of Hanoi, 2019-2022 (Espelia/ICE/Institut Paris Région/Airparif/ASEC, MEUR 1.5) - **see separate presentation**

PILLAR 3 : REDUCING POLLUTION BY ACTING IN SECTORS

EXAMPLES

Egypt – Air pollution and climate change management in Greater Cairo - waste and transport sectors (**USD 200 million, World Bank**):

- **Strengthening air quality management ($17.5m):**
  - **Pollution and GHG reduction ($3.5m):** integrated climate-energy plans, complementary emission inventories, measurement support, training, environmental impact assessment and cost-benefit analysis of pollution reduction actions
  - **Strengthening resilience to pollution ($14m):** forecasting tools (integration of AQ data/transport model), definition of response mechanisms to specific pollution episodes
- Improvement of the solid waste management system ($126m)
  - Infras ($108m): Rehabilitation / construction of treatment centres, closure of a landfill
  - Health and Waste Management ($10m) and Capacity Building ($8m)
- **Vehicle emission reduction ($40m):**
  - **Electric buses and associated infrastructure ($36m) (depots, charging, electrical supply)**
  - **Miscellaneous ($4m): QA management and transport planning, training of bus operators in electric mobility, action plan for deployment of electric buses.**
- Capacity building, support for behavioural change, communication: support for ragpickers, training for SMEs on green jobs and the circular economy, partnerships with NGOs

PILLAR 4: EVALUATING IMPACTS

Objective
Assessing the air quality impacts of public policies and investments

Operational actions

- Support in defining a baseline (ex-ante AQ measures)
- Support for the definition of the perimeter (geographical and temporal, pollutants considered) and of a methodology for assessing the impacts of the measures taken (what causal link between a project and the evolution of air quality?)
- In situ post-action AQ monitoring
- Promotion of the use of modelling to estimate the impact of actions

PILLAR 4: EVALUATING IMPACTS

EXAMPLES

Vietnam – Evaluation of impacts of pedestrianisation around Hoan Kiem Lake, institutional communication and digital application, 2020-2021(206 kEUR, FICOL Region IdF / AFD / Ville de Hanoi / Airparif)

Senegal – Evaluation of the impacts on AQ of a mass-transit transport projects in Dakar (TER, BRT) (common World bank, AFD, Airparif, Numtech actions)

The World Bank is addressing the issue of air pollution through several approaches:

- Financing a reference pollution monitoring station as part of its financing of the BRT project in Dakar
- Funding an emissions inventory for the transport sector
- Using the work of Numtech (see Fasep project sheet), also in collaboration with AFD/Airparif, to assess the positive impacts in terms of pollution reduction of the implementation of a cluster of transport projects in a Dakar corridor (BRT Bank and TER AFD).

Paris, France – Evaluation of the impacts of Seine banks closing in Paris, 2017 (Airparif). Basically, pollution has decreased on the banks of the river and in the immediate vicinity but has moved to the east of Paris in particular.

PLEASE BREATHE!
THANK YOU!!

INDONESIA

Building scenarios of transport sector evolutions within a low-carbon trajectory also dealing with air pollution reduction

Rising awareness: upstream study Monitoring

Indonesia

2021

CZZ 2610 AQ AFD Facility (component#3)

300 kEUR

Partners:
Bappenas (ministry of Planning)
+ other ministries (Transport, Environment, Energy, Industry, Health, Agriculture, Meteo agency)

Consulting Team:
WRI /NCE

CONTEXT

Indonesia is committed to reducing its GHG emissions by 41 % by 2030 while maintaining 5-6 % annual growth, being aware of the negative externalities it generates (on land, water, air) and **developing alternative development models**. In January 2020, the country adopted its National Medium-Term Development Plan 2020-2024, through which it intends to follow a low-carbon trajectory and implement innovative public policies.

The ministry of Planning (Bappenas) is key, notably through its Vision 2045.

DESCRIPTION

The study aims at:

- **Supporting the development of policies consistent with the low-carbon objectives** of Vision 2045, **focusing on air pollution and its health impacts generated by the transport sector**
- **Developing a transport investment scenario based on these public policy recommendations.**

It shall lead to:

- The study of evolution scenarios of air pollution and health impacts associated with different CO_2 emission trajectories. **This includes an assessment of the impacts of a business as usual scenario in the transport sector on health and potentially on the country's productivity.**
- **Further development of the transport sector model in Vision 2045 and the establishment of scenarios for the transport sector, identifying co-benefits and necessary investments.**
- Support for air quality measurement methodology in Indonesia

IMPACTS/EXPECTED NEXT STEPS

- AFD's entry into the dialogue with the key player in Indonesia transport planning and investment policy
- **Identification of projects / programs in the transport sector that are "climate" and "air pollution reduction"**

EGYPT – World bank

Air pollution and climate change management air in *Greater Cairo (GC)* – waste and transport sectors – 1/2

Monitoring
Reducing

Egypt

2020-2026

Loan

200 M$

Beneficiary:
Egypt, ministry of Environment

http://documents1.worldbank.org/curated/en/788691601776867710/pdf/Egypt-Greater-Cairo-Air-Pollution-Management-and-Climate-Change-Project.pdf

CONTEXT

A 2019 study on the environmental costs in Egypt points to the major issues of **air** and water **pollution** in Greater Cairo, with health effects generating **an annual loss of 1.4 % of GDP**. Pollution also affects Egypt historical heritage and diminishes the country attractiveness as a tourist destination, while tourism accounts for 12 % of GDP and 10 % of jobs.

Despite a 25 % reduction in PM10 over the last 10 years (including, according to a 2019 study, **a 3 % reduction thanks to the opening of metro line 3 in 2012 and its extension in 2014**), and an issue prioritised by the authorities, which have set themselves the goal of a 50 % reduction in PM10 by 2030 (Egypt Vision 2030), concentrations of PM10 pollutants, for example, remain 1.5 times higher than national standards and 6 times higher than WHO thresholds.

DESCRIPTION

The project focuses on short-lived climate pollutants, such as soot carbon, from waste burning and incomplete combustion, because of their dual impact on air quality and climate. It has been estimated that in GC, **waste burning and transport** (22 million trips per day, 63 % of motorised trips in public transport but sulphur levels in the CTA fleet 100 times higher than international standards), **generate** (in equal parts) **2/3 of PM10**. It has 4 components:

- **Strengthening AQ management ($17.5m) :**
  - **Pollution and GHG reduction ($3.5m):** integrated climate-energy plans, complementary emissions inventories, support for measurement, training, environmental impact assessment and cost-benefit analyses of pollution reduction actions
  - **Strengthening resilience to pollution ($14m):** forecasting tools (integration of AQ data/transport model), definition of response mechanisms to specific pollution episodes

.../...

EGYPT – World bank

Air pollution and climate change management air in *Greater Cairo (GC)* – waste and transport sectors – 2/2

Monitoring
Reducing

Egypt

2020-2026

Loan

200 M$

Beneficiary:
Egypt, ministry
of Environment

DESCRIPTION

- Improving waste management system ($126m)
  - Infrastructure ($108m) : Rehabilitation / construction / closing of waste centers
  - Health and waste management $10m) and Capacity building ($8m)
- **Reduction of vehicles emissions ($40m) :**
  - **Electric busses and associated infras ($36m)** (depots, charging points, power supply)
  - **Miscellaneous ($4m) : AQ management and transport planning, training for bus operators in electric mobility, actions plan for electric busses development**
- Capacity building, support to behaviours change, communication : support to waste workers, training for Small businesses on green jobs and circular economy, partnerships with NGOs

IMPACTS / EXPECTED NEXT STEPS

- **Expected benefits of improved air quality for 18 million people in the GC, of which 48.5% are women and specific categories: waste sector actors, 25,000 daily users of electric buses.**
- Reduction of GHG emissions from waste
- Reduction of large annual fires generated by solid waste
- **Reduction of CO2 and black-carbon emissions from electric buses**
- Number of measuring equipment installed
- Establishment of a national pollution episode response system
- Establishment of the Climate Air Plan for the GC
- Waste infras built / dismantled
- **Number of electric buses put into service and associated equipment, traffic observed, CTA staff trained**
- **Increase in satisfaction rate and perception of safety of bus users; action plan for improvement of bus service**
- Number of NGOs involved
- Increase in % of women employed in the waste sector
- Number of people better informed about pollution

Integrating air quality into sustainable urban mobility planning and investments

Case studies: Hanoi, Dakar, South-East Asia

***MYC Webinar*, 23.11.2021**

Stéphane CARCAS, Deputy Head, AFD Paris, Mobility and Transport Division

source: vietnamnet.vn, 10/2016

AGENDA

A. A long term AFD / Airparif support for Hanoi City, Vietnam

B. Structuring a support to Air Quality policy in Dakar, Senegal

C. AFD Air Quality regional approach and project, South-East Asia

A. A long term AFD / Airparif support for Hanoi City, Vietnam

A long term AFD/Airparif for Hanoi, Vietnam

POOR AIR QUALITY AFFECTS PEOPLE HEATH AND HANOI CITY INTERNATIONAL ATTRACTIVENESS

- Sustainable Cities Index – ARCADIS: Hanoi **drops from rank 87 in 2016 to rank 98 in 2018** (out of 100 cities).
- Quality of Living City Ranking – Mercer – 2019: Hanoi **drops from rank 147 in 2012 to rank 155 in 2019** (out of 231 cities).
- Air and water pollution alone can cause economic losses of **up to 12 percent of national GDP.**

source : Tran Khanh Hung, and Nguyen Duc Hung, 2014, State Financial Transfers in Environmental Protection: The Case of Vietnam. Journal of Economics and Development + Environmental Science & Technology, Harvard University 2017

Polluant	Valeur réglementaire	Paramètre	OMS
PM_{10}	50 µg/m³	Moyenne annuelle	20 µg/m³
	150 µg/m³	Moyenne journalière	50 µg/m³ à ne pas dépasser plus de 3 jours par an
$PM_{2.5}$	25 µg/m³	Moyenne annuelle	10 µg/m³
	50 µg/m³	Moyenne journalière	25 µg/m³ à ne pas dépasser plus de 3 jours par an
NO_2	40 µg/m³	Moyenne annuelle	40 µg/m³
	100 µg/m³	Moyenne journalière	-
	200 µg/m³	Moyenne Horaire	200 µg/m³
SO_2	50 µg/m³	Moyenne annuelle	-
	125 µg/m³	Moyenne journalière	20 µg/m³
	350 µg/m³	Moyenne Horaire	-
O_3	80 µg/m³	Moyenne journalière	-
	120 µg/m³	Moyenne sur 8 heures	100 µg/m³
	180 µg/m³	Moyenne Horaire	-
C_6H_6	22 µg/m³	Moyenne annuelle	-
Pb		Moyenne annuelle	0,5 µg/m³

Tableau 2 : Normes de qualité de l'air en vigueur au Vietnam
(Source : http://airlex.web.ua.pt) et valeurs guides de l'OMS

In international newspapers: "Bad news, Hanoi is becoming the 7th most polluted capital in the world"

Mauvaise nouvelle: Hanoi devient la septième capitale du monde la plus polluée

mars 2, 2020 Par AMO TRAVEL

Hanoi devient la septième capitale du monde la plus polluée

Hanoi est devenue la **septième capitale du monde la plus polluée**, encore pire que Pékin, selon un nouveau rapport d'IQ AirVisual.

III.5. La qualité de l'air à Hanoï[10]
III.5. Air quality in Hanoi

source : Airparif

Les données historiques disponibles sur la ville de Hanoï proviennent principalement de deux sources :

- une station de mesure mise en œuvre par le MONRE (*Ministry of Natural Resources and Environment*).
- ainsi que de la station de l'Ambassade des Etats-Unis.

Les résultats de ces deux stations sont disponibles en temps réel sur le site internet http://aqicn.org/city/vietnam/hanoi/us-embassy/, sous la forme d'indice de qualité de l'air AQI.

2016 annual average PM2.5 level: 2x VN threshold = 5x WHO guidelines

Ces résultats mettent en évidence des niveaux de particules élevés. La moyenne annuelle en **$PM_{2.5}$** en 2016 est de 50 µg/m³, soit **deux fois plus que la valeur fixée par la réglementation vietnamienne, et 5 fois plus que la valeur recommandée par l'OMS**.

De nombreuses mesures de qualité de l'air ont également été réalisées par le DONRE[11].

Ces mesures ont été réalisées par campagnes de mesures ponctuelles, au moyen notamment de tubes à diffusion. Ces mesures, de courte durée, sont plus difficiles à comparer aux normes de qualité de l'air annuelles.

High levels of SO2, CO, C6H6, NO2

Elles mettent néanmoins en évidence des concentrations très élevées en dioxyde de soufre (SO_2), monoxyde de carbone (CO), benzène (C_6H_6), particules et dioxyde d'azote (NO_2) dans les zones industrielles, ainsi que dans les villages d'artisanat, mais également dans les zones résidentielles.

A long term AFD/Airparif for Hanoi, Vietnam

PROGRESSIVE SUPPORTS OVER YEARS - MONITORING

2017

FERC, 120 kEUR
Airparif Expertise
Hanoi City, DONRE

Review and proposals for sizing Hanoi Air Quality monitoring network: 42 recommended stations

Capacity building activities

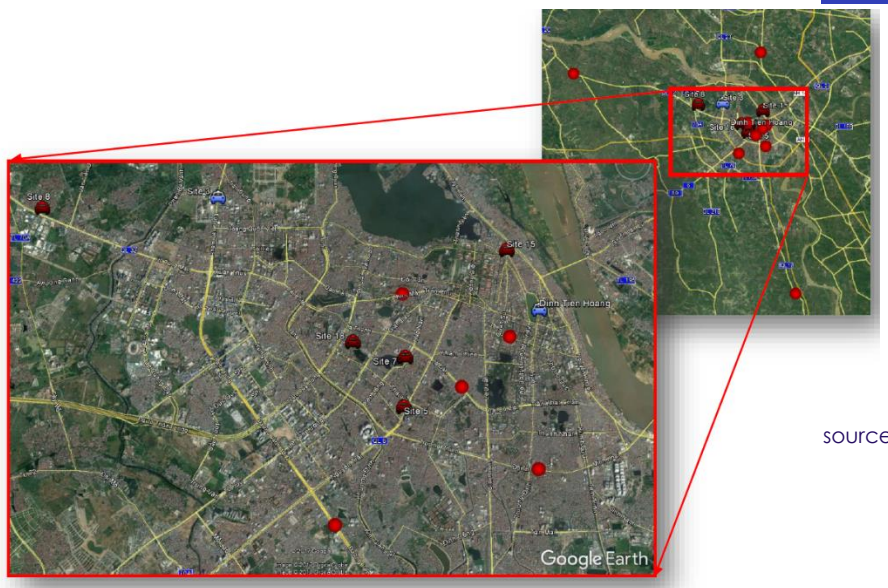
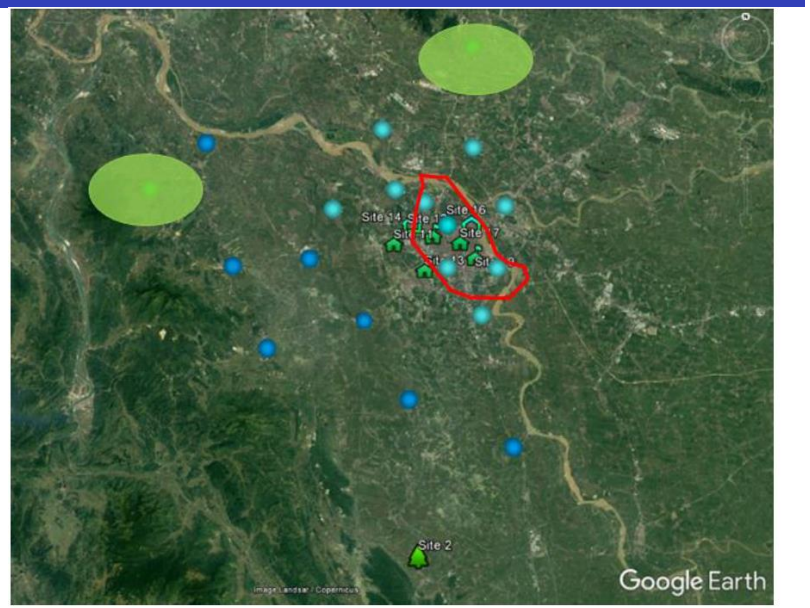


Figure 19 : Proposition d'implantation des sites de mesure en situation de proximité au trafic routier, prenant en compte les sites déjà identifiés par le DONRE

source : *Airparif*



16 : Proposition de dimensionnement du réseau de mesure de fond en zone rurale sur la province de Hanoï.

A long term AFD/Airparif for Hanoi, Vietnam

PROGRESSIVE SUPPORTS OVER YEARS – EVALUATION OF A PILOT PROJECT

2020 – 2022	AFD FICOL 500 kEUR grant + *Region IdF (Paris)* + Hanoi City : 1.1 MEUR Hanoi City, DONRE Post - evaluation of Hoan Kiem Lake pedestrianization Supports from PRX Vietnam on urban planning, air quality, green spaces, waste management

A long term AFD/Airparif for Hanoi, Vietnam

PROGRESSIVE SUPPORTS OVER YEARS – RESIDENTIAL TA AND PROJECT PREPARATION

(2018-2019) 2020 – 2022

AFD FAPS grant, 1.5 MEUR
Residential TA
Espelia/IAU/Airparif/ASEC
Hanoi City, DONRE

Sectoral review on waste, freight transport and urban logistics, transport and electric mobility, food security.

Identification of an investment program aiming at reducing air pollution

VIETNAM
Residential multisector TA in Hanoi

Reducing pollution: preparing projects/programs/ DPLs

Vietnam

2020-2022

FAPS

1.5 MEUR

Partners:
Hanoi City

Consulting Team:
Espelia/Institut Paris Region/Codatu/ Airparif/ASEC

CONTEXT

Hanoi ranks **7th** (out of 85 in the IQAir 2019 report) among **the world's polluted cities** in terms of annual average PM2.5 concentration, with **a level 5 times higher than the WHO threshold.**

In 2016-2017, AFD financed an Airparif expertise for the sizing of the AQ monitoring network, resulting in an identified need for 42 stations.

DESCRIPTION

The Technical Assistance set up at the beginning of 2020 for 3 years aims to (i) continue the process undertaken with Airparif expertise in 2017 and (ii) respond to the request of Hanoi, City which has positioned AFD on 3 topics:

- **The establishment of a wholesale market,** in connection with the issue of **food security**
- Thus, the problem of **urban logistics and the transport of goods in the city**
- **Waste management**.

The guiding principle of these issues is **to improve air quality in Hanoi**.

The objectives of the TA are to:

- **Produce a number of studies, such as an opportunity study for the development of electric mobility in Hanoi,** a study for the creation of a CET, a study for a wholesale market
- Provide capacity building to the City, including the implementation of the recommendations on the monitoring network.

IMPACTS / EXPECTED OUTCOMES

The ultimate goal is **to identify and define one or more projects, or (multi)sectoral investment programs, aiming at improving the transport** and/or waste **sector in Hanoi and thereby the air quality in Hanoi; and/or to define an Air Quality DPL.**

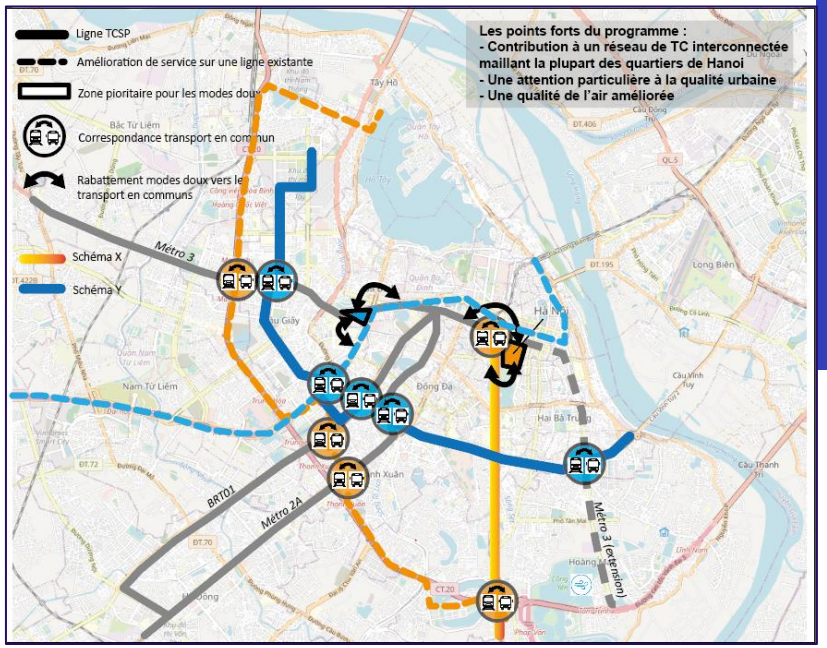
A long term AFD/Airparif for Hanoi, Vietnam

PROGRESSIVE SUPPORTS OVER YEARS – TOWARDS A AQ / TRANSPORT PROGRAM FINANCING

2022 – 2025?

AFD concessional loan, XXX MEUR
Republic of Vietnam

- Transport:
  - Mass-transit transport service / quality bus corridors
  - Active modes
- AQ
  - TA: training for maintenance, monitoring campaigns
  - Station
  - Lab. equipment (calibration)



A long term AFD/Airparif for Hanoi, Vietnam

PROGRESSIVE SUPPORTS OVER YEARS – TOWARDS A AQ / TRANSPORT PROGRAM FINANCING

Thematic	Action	1. Soft deliverable from TA		2. Investment program (preliminary study)	App. Inv. Amount	Beneficiary	Potential implementing agency
		Technical	Financial / regulatory				
1. Development of public transport	1.1 Road improvment for buses on a pilot line			X	1-10M€	HPC	HPC DOT/TRAMOC
	1.2 Bus stop access on a pilot line			X	1-10M€	HPC	DOT/TRAMOC
	1.3. Improve bus management on a pilot line	X			-	HPC	TRAMOC
	1.4 BRT /Tram project - pilot line			X	50-150M€	HPC	DOT/TRAMOC
2. Green the motorbike fleet	2.1 Promote electric motorbikes for households	X	X		-	HPC	DOT/DONRE
3. Limitation of private vehicles	3.1 Urban toll / low emission zone	X	X	X	10-50M€	HPC	DOT /DONRE
4. Promote active modes	4.1 Temporary pedestrian areas	X	X		-	HPC	DOT
	4.2 Calm and shared spaces			X	1-10M€	HPC	DOT

B. Structuring a support to Air Quality public policy, Dakar, Senegal

FASEP SENEGAL - DAKAR

Monitoring and digital platform for information on various pollution

Monitoring, modelling, informing

Senegal

2020-2022

FASEP (Green innovation facility)

1.2 MEUR (FASEP: 780 k€)

Partners : Ministry of Environment and Sustainable Devt (MEDD) / DEEC, ministry of Health, Dakar City, CGQA, CETUD, Dakar University (UCAD), *Enda Energe* NGO.

Consulting Team: Numtech, Creocean (Keran group), Ambiciti, Somei

Meteo: AQ Index in Dakar is red (CGQA)

CONTEXT

The capital Dakar occupies less than 1% of Senegal territory but accounts for 80% of GDP.

Transport (congestion, car fleet, sulphurous fuels), industrial installations, biomass and waste burning, natural pollution also linked to seasonal desert dust events, explain **pollution rates several times higher than the WHO "thresholds":** 3 to 4 times for annual averages of PM2.5, 5 to 7 times for PM10, based on some data.

Senegalese regulations already include the issue of air pollution, and there are existing bodies in charge, notably the CGQA.

Despite the presence of 6 reference stations, **the data nevertheless remain incomplete.**

DESCRIPTION

The project **aims over 2 years** to address air, water and noise pollution by aggregating information on an integrated platform to be created called Halam-Bi.sn. For air pollution, this involves :

- **Develop a network of microsensors, in addition to a reference station (?), for a total of 400 k€, and carry out two *ad hoc* monitoring campaigns (estimated at 18 000 €).**
- **Carry out a spatialized emission inventory**
- **Work on modelling** (Numtech UrbanAir® system)

IMPACTS

Les données de la plateforme doivent être accessibles aux autorités et à la population.

Structuring a support to AQ public policy in Dakar, Senegal

DIAGNOSIS AND RECOMMANDATIONS MISSION, AIRPARIF, 2020

2020

AFD funding, AQ Facility
Airparif
/ Atmo Grand Est Mission

Local stakeholders met:

- Dakar City
- CGQA (AQ Management Center) from ministry of Environment and Sustainable Development (MEDD) / Directorate for Environment and Classified Establishments (DEEC)
- CETUD : *Conseil Exécutif des Transports Urbains* in Dakar (Dakar urban transport authority)
- *Etc*.

Structuring a support to AQ public policy in Dakar, Senegal

DEFINITION OF AN ACTION PLAN, 2021

2021

Monitoring network

- Relocation of Yoff station
- Support to the location of Diamniadio station
- Support to deployment of microsensors (location, training, purchase)
- Support to global sizing, use and maintenance of the monitoring network

Emissions inventory and modelling

- Diagnosis of existing
- Finalisation of a platform on emissions inventory (pollutants + GHG), sectoral and spatialized.
- Finalisation of a modelling tool
- Feasibility study for setting up an AQ predicting model

Structuring a support to AQ public policy in Dakar, Senegal

DEFINITION OF AN ACTION PLAN, 2021

2021

Governance and communication

Workshop on air/climate/energy integration

Support to financial sustainability of CGQA

Support to strengthening of institutional, scientific and communication as well as with civil society

Projects preparation

Definition and support to implementation of a pilot project in the framework of JOJ (Youth Olympic Games)

Evaluation of the AQ impacts of AFD 2021 Bus project in Dakar

AFD-financed TER (suburban train) project

World Bank-financed BRT project

C. AFD Air quality regional approach and project South-East Asia

SOUTH-EAST ASIA
Regional project for improving air quality

Rising awareness
Monitoring
Reducing pollution: preparing projects

10 and then 3-4 countries in South-East Asia

2020-2022+

AFD CZZ AQ global Facility (component#1) + additional AFD specific CZZ SEA AQ grant funding

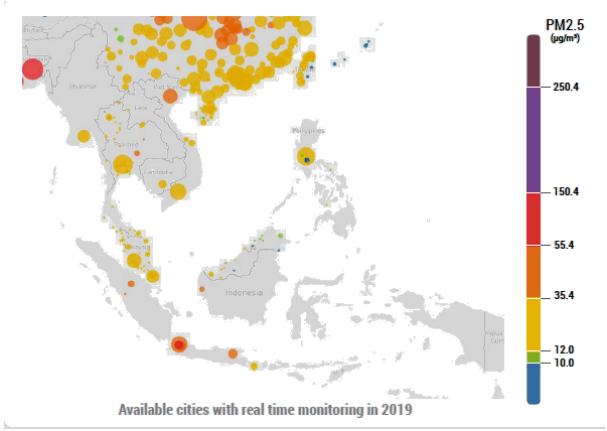
2,5 M€

Partners :
Various in selected countries

Consulting Teams: to be awarded

CONTEXT

On a world map, South-East Asian countries are less polluted than India, China and Bangladesh, but (i) **cities in this area are nevertheless at the top of the list of the most polluted cities**, e.g. in terms of annual PM2.5 concentration (Jakarta 5th, Hanoi 7th, Rangoon 19th, Bangkok 33rd, Phnom Penh 39th, out of 85); (ii) **the situation is worsening rapidly**: between 1990 and 2010, this is the area where this pollution has evolved most rapidly.



Available cities with real time monitoring in 2019

DESCRIPTIF

Three phases are developed for the project:

- **2020-2021:** Airparif conducted a diagnosis of the issues, stakeholders (ministries, dedicated agencies, universities, *etc.*), equipment and data available in 10 countries in the zone. On this basis, 3-4 countries were selected: **Indonesia, Cambodia and Thailand in a first place**; Vietnam could also be dealt with. Missions have been carried out in these countries to identify needs.

3.2%

Regional cities which met the WHO PM2.5 target in 2019

- **2021-2022 :** a specific AFD 2.5 MEUR grant for this SEA AQ project has been mobilized in order to define action plans for each country, to finance building capacity actions, feasibility studies of projects, pilot projects. **A regional component with ASEAN is envisaged.**

- **2022 : the objective is to prepare and make AQ projects approved by AFD Board (projects and/or programs and/or DPLs) in each of those countries.**

The project is consistent with an IRD regional project on black-carbon.

Fact finding mission in Indonesia

- **Dates:** from March, 29th to April, 1st.

- **Participants** : AirParif, AFD : Regional Office and Jakarta Agency

- **Meetings with a wide range of stakeholders**.
  - → **Indonesian Governement** : BAPPENAS, MoEF – BAPEDAL, West Java and North Sumatra Provincial Governments + Bandung and Medan Cities
  - → **Indonesian Academics** : Bandung Institute of Technology,
  - → **International organizations & Think tanks** : Vital Strategies, WRI, CIRAD, GIZ.

Indonesia Country Program

	Activity	Budget
1. Support to MoEF	Development of a data management system	110
	Development of an early warning system	
2. Support to BMKG	Technical expertise for project preparation "Enhancing National Climate and Air Quality Services"	100
3. Support to West Java Province (Bandung)	Analysis of the composition of vehicles fleet	115
	Emissions inventory / analysis of the sources of pollution	
4. Support to North Sumatra Province (Mebidangro)	Analysis of the composition of vehicles fleet	115
	Emissions inventory / analysis of the sources of pollution	
5. Support to MoEF, BAPPENAS and MoT	Review of existing policies and rod map for transport and mobility	50
Program management		
All partners	Program management & coordination of activities	100
	Workshops / trainings / policy recommendations	50
	Travel expenses for international experts	30
	TOTAL	**670**

Fact finding mission in Cambodia

- **Dates :** from April, 5th to April, 12th.

- **Participants** : AirParif, AFD : Regional Office and Phnom Penh Agency

- **Meetings with a wide range of stakeholders**.
  - → **Cambodian institutions** : Ministry of Environment, Ministry of Public Works and Transportation (MPWT), Siem Reap Province, Phnom Penh Municipality, APSARA
  - → **Cambodian Academics** : RUUP Royal University of Phnom Penh, etc
  - → **International Organizations** : UNEP, UNDP, GGGI
  - → **NGOs** : GERES
  - → **Bilateral and multilateral donors** : JICA, World Bank.

Cambodia Country Program		
	Activity	**Budget**
1. Support to MoE	Technical assistance on data quality and reliability	200
	Technical assistance on data collection on emissions from transport	
	Capacity-building on emissions inventory use for policy-making	
2. Support to MPWT	Technical assistance on regulatory/policy-making for vehicles emissions control	140
	Support to existing projects on electric mobility	
3. Support to Siem Reap Municipality	Feasibility study on RDF development potential in Siem Reap	100
All partners	Program management & coordination of activities	100
	Policy recommendations / workshops & trainings	50
	Travel expenses, organization, logistics	30
	TOTAL	**620**

Fact finding mission in Thailand

- **Support to 4 key partners:**
  - Ministry of Environment – PCD
  - Ministry of Transport – OTP
  - City and Province of Chiang Mai
  - BMA

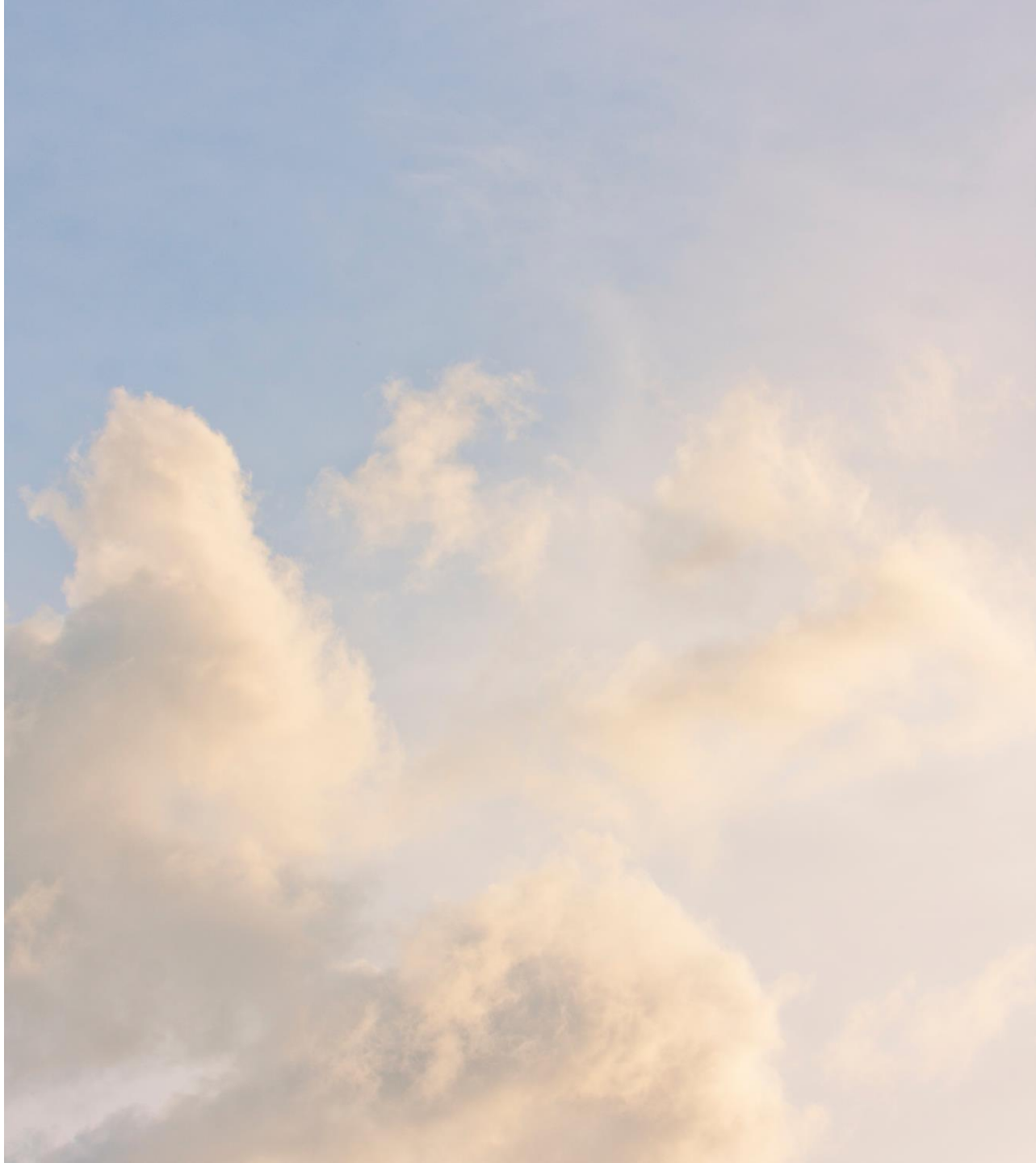
- **Local technical partners to associate/coordinate:**
  - UN-ESCAP
  - CCAC
  - AIT
  - JICA
  - GIZ

Thailand Country Program		
	Activity	**Budget**
1. Support to PCD	Support the PCD to strengthen the Thai Air Quality Management System.	140
	Support the PCD in its effort to build the capacity of local Thai agencies and share its expertise in AQM with ASEAN countries.	
2. Support to MoE, MoT and MoEnergy	Support the Ministry of Environment, the Ministry of Transport and the Ministry of Energy in policies implementation and enforcement for vehicles and industry emission standards	40
3. Chiang Mai City and Province	Emission inventory / analysis of source of pollution	140
	OR	
	Composition of the vehicles fleet in Chiang Mai	
4. BMA	Development of public transport system in Bangkok	100
Program management		
All partners	Program management & coordination of activities	100
	Workshops / trainings / policy recommendations	50
	Travel expenses for international experts	30
	TOTAL	**600**

YOU CAN BREATHE…
THANK YOU !!

Poll: Integrating air quality into sustanable mobility planning

→ Check the chat for instructions or use the QR code for access



Monitoring air quality

Lessons learned from the study "Measures to modify urban road traffic and outdoor air quality"

Mobilise Your City

MobiliseYourCity evaluation indicators

6 key indicators « Core Indicator and Monitoring Framework »

1. GHG emission reductions (expected)
2. Accessibility
3. Safety
4. Air pollution (optional)
5. Modal share
6. Cost of public transport

MobiliseYourCity evaluation indicators

Definition of Air Pollution indicator: "Mean annual urban air pollution of fine particulate matter (in µg PM2.5) at road-based monitoring stations within the area covered by the SUMP."

$$Annual\ average\ urban\ air\ pollution = \frac{\sum Annual\ average\ air\ pollution\ at\ station\ n}{Total\ number\ of\ stations\ within\ the\ area\ covered\ by\ the\ SUMP}$$

WHO Guideline (2005): 10 µg PM2.5

Presentation of the study

To establish **a state of the art of the knowledge** of the **impacts on urban air quality** of measures aiming at **limiting road traffic emissions** in urban areas and of the corresponding methods of evaluation of these impacts at the European scale.

Presentation of the study

Section 1: "Image" of air pollutant and greenhouse gas emissions from road traffic in French cities

Section 2: European overview of local measures to modify road traffic in cities and their impacts

Section 3: Critical analysis of impact assessment methods and perspective on the impacts identified with regard to urban air quality in France

Description of section 1

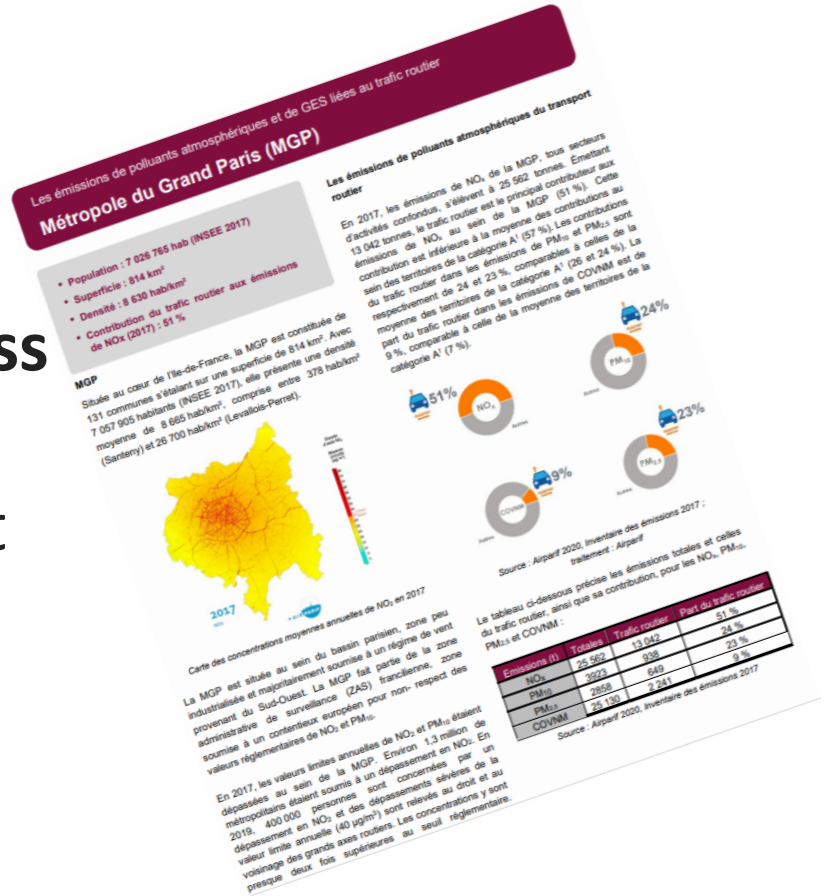
To **provide an "Image" of air pollutant and greenhouse gas emissions related to road transport** in French cities.

- Assess the contribution of road transport (NOx, PM10, PM2.5, NMVOCs) in cities/EPCIs in relation to the national scale
- Assess the variability of contributions according to the territories:
  - Define and provide emission indicators to classify cities according to their typology
  - Evaluate the local variability of vehicle technology fleets
- Establish profiles of "typical" urban areas to enable each territory to position itself

Main findings of part 1

- The more **densely populated the areas are, the less "car dependency"** there is
- **Travel rates** by private vehicle and public transport **vary greatly between territories**

  ⇨ Differences in the public transport offer of the territories


Les émissions de polluants atmosphériques et de GES liées au trafic routier

Métropole du Grand Paris (MGP)

- Population : 7 026 765 hab (INSEE 2017)
- Superficie : 814 km²
- Densité : 8 630 hab/km²
- Contribution du trafic routier aux émissions de NOx (2017) : 51 %

MGP

Située au cœur de l'Île-de-France, la MGP est constituée de 131 communes s'étalant sur une superficie de 814 km². Avec 7 057 905 habitants (INSEE 2017), elle présente une densité moyenne de 8 665 hab/km² comprise entre 378 hab/km² (Santeny) et 26 700 hab/km² (Levallois-Perret).

Carte des concentrations moyennes annuelles de NO_2 en 2017

La MGP est située au sein du bassin parisien, zone peu industrialisée et majoritairement soumise à un régime de vent provenant du Sud-Ouest. La MGP fait partie de la zone administrative de surveillance (ZAS) francilienne, zone soumise à un contentieux européen pour non- respect des valeurs réglementaires de NO_2 et PM_{10}.

En 2017, les valeurs limites annuelles de NO_2 et PM_{10} étaient dépassées au sein de la MGP. Environ 1,3 million de métropolitains étaient soumis à un dépassement en NO_2. En 2019, 400 000 personnes sont concernées par un dépassement en NO_2 et des dépassements sévères de la valeur limite annuelle (40 µg/m³) sont relevés au droit et au voisinage des grands axes routiers. Les concentrations y sont presque deux fois supérieures au seuil réglementaire.

Les émissions de polluants atmosphériques du transport routier

En 2017, les émissions de NO_x de la MGP, tous secteurs d'activités confondus, s'élèvent à 25 562 tonnes. Émettant 13 042 tonnes, le trafic routier est le principal contributeur aux émissions de NO_x au sein de la MGP (51 %). Cette contribution est inférieure à la moyenne des contributions au sein des territoires de la catégorie A' (57 %). Les contributions du trafic routier dans les émissions de PM_{10} et $PM_{2,5}$ sont respectivement de 24 et 23 %, comparables à celles de la moyenne des territoires de la catégorie A' (26 et 24 %). La part du trafic routier dans les émissions de COVNM est de 9 %, comparable à celle de la moyenne des territoires de la catégorie A' (7 %).

51%
24%
23%
9%

Source : Airparif 2020, Inventaire des émissions 2017 : traitement : Airparif

Le tableau ci-dessous précise les émissions totales et celles du trafic routier, ainsi que sa contribution, pour les NO_x, PM_{10}, $PM_{2,5}$ et COVNM :

Emissions (t)	Totales	Trafic routier	Part du trafic routier
NO_x	25 562	13 042	51 %
PM_{10}	3923	936	24 %
$PM_{2,5}$	2859	649	23 %
COVNM	25 130	2 241	9 %

Source : Airparif 2020, Inventaire des émissions 2017

- Importance of implementing **measures to reduce** road traffic emissions on the whole territory but **adapted to each territory profile**
- Limitation of road traffic emissions
  - **Renewal of the fleet (NOx / particles)**
  - **Abrasion => limitation of road traffic necessary**

Main findings of part 2

Objectives :

- Identify any measures or actions taken or planned by European local authorities **to reduce road traffic in cities**,
- Analyse the **impacts on road traffic and the related reductions in emissions and concentrations**,
- To draw up an inventory to establish an **overall assessment** of the impacts of road traffic reduction measures.

Main findings of part 2

Pedestrianisation: Observation of a reduction of up to 70% of particulate carbon and up to 40% of NO2

Pollutant	Impact of measures on traffic	Evolution of emissions	Changes in concentration	Causes of an improvement of air quality
NO_2	Decrease from 17 % to 32 %	↘	Betweeen [-38% : - 46 %]	Traffic reduction + technical upgrading
PM_{10} et $PM_{2.5}$			Up to – 34 % and -44 %	
Black Carbon			Up to – 70 %	
CO			Up to – 75 %	

Table 6: Summary table of the impact of pedestrianisation. CEREA processing

Pollutant	Impact of measures on traffic	Evolution of emissions	Changes in concentration	Causes of an improvement of air quality
NO_2	Decrease from 1 % to 6 %	Up to – 6 %	Between – 5 % and – 8 %	Decrease in the number of car journeys
PM_{10}		Up to – 8 %	unknown	
CO_2		Up to – 7 %	unknown	

Parking: greater local reduction in particulate emissions than nitrogen dioxide,

Table 7: Summary table of the impact of parking management in the city for the 2 modelling cases. CEREA processing

Main findings of part 2

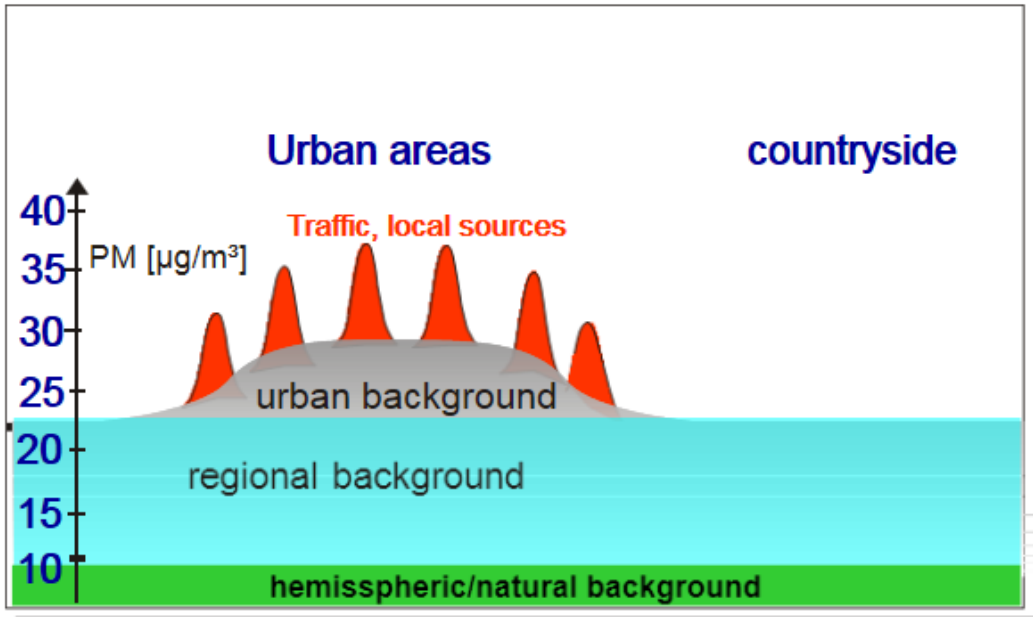
- Measures leading to reductions in traffic, and even **reductions in the associated pollutant emissions and air pollutant concentrations in the areas concerned.**
- The creation of additional traffic lanes will always generate new demand, called **"induced demand".**
  - When a traffic lane is closed, traffic reductions are observed over the whole territory concerned, "**evaporated traffic**".
  - On the other hand, when road capacity is increased, more traffic is generated - **"induced traffic"** - to the extent that **the level of the reference situation (initial state) is restored.**
- Changing the parking supply and tariffs will always discourage car use in the city.

Main findings of part 3

Objectives :

- Analyse the methodologies for assessing the impacts on traffic and air pollutants of the measures identified in the component:
  - **critical analysis** of the evaluation method used
  - **comparison with the air quality** observed in French cities

Main findings of part 3



- **Decrease in emissions of studied pollutants** when urban development leads to a **reduction in road traffic**

- Other primary pollutants are likely to be impacted by developments, as well as secondary pollutants
- Limiting the formation of **secondary particulate matter**
- **Soot carbon: a tracker of air pollution from road transport**
- Soot carbon concentrations decrease more rapidly than NOx concentrations (exhaust + non-exhaust emissions)
- The impact of an action will be more or less effective on air quality depending on the **physical and atmospheric environment of the study city**

Overall findings

- Difficulty in **separating the impacts of an individual measure** on pollutant emissions
- Difficulty in **estimating the impact of a traffic reduction measure on air concentrations**: the results presented in this study should be **interpreted with caution**
- A traffic reduction measure will be more effective if drivers **have attractive alternatives** and are motivated to use them.
- Need to implement road traffic emission reduction measures **adapted to each territory**.
- Different road traffic reduction strategies reduce **pollutant emissions at the local level.**

Thank you for your attention

Mobilise Your City

Airparif's role in supporting local authorities

Our missions

Monitor
Monitoring the air released by the Francilines with a robust and reliable measuring device

Understand
Understanding air pollution and its impact in by contributing to build knowledge

Support
Supporting citizens and actors by informing, raising awareness and evacuating the actions

Innovate
Promoting innovation by facilitating the emergence of new solutions to improve air quality

Mission to support decision-makers

- Evaluate the effectiveness of action plans (*a priori or a posteriori*)
- Provide decision-making tools
- Supporting the deployment of innovative solutions
- Promote dialogue and inform stakeholders

Evolution of road traffic in Paris (2002-2012)

Mobilise Your City

The evolution of traffic-related air pollution in Paris (2002-2012)

Isolating parameters influencing the evolution of road traffic emissions:

- Traffic volume
- Composition of the fleet (type of vehicles)
- Composition of the technological fleet (Euro standards)
- Distribution of petrol / diesel vehicles
- Road typology
- Background pollution levels

Assessing the impact of policies on air quality:

- Local: development work to reduce traffic and speed (City of Paris)
- National: tax incentives on diesel (France)
- European: Euro standards for vehicle emissions (European Union)

http://lodel.irevues.inist.fr/pollutionatmospherique/index.php?id=2535&format=print

Another study on traffic-related air pollution in Paris and London – evaluation of Low Emission Zones impact by King's College and Airparif: https://www.airparif.asso.fr/actualite/2019/pollution-de-lair-et-trafic-routier-londres-paris

Mobilise Your City

The evolution of traffic-related air pollution in Paris (2002-2012)

The total emissions related to traffic have decreased due to:

- European regulations (increasingly stringent Euro standards)
- Road improvements to reduce traffic and speed

For CO2, local measures had the most impact ; for NOx and PM European regulations had the most impact

The overall reduction of emissions was less than expected because of an increase of emissions linked to :

- The French policy of incentives on diesel
- Changes in the composition of the fleet (increase in the share of LCVs and HGVs)

Emissions (2002-2012)	NOx	PM10	CO2
Traffic and speed reduction plans (road improvements)	-11%	-9%	-10%
Modernisation of the fleet (Euro standards)	-25%	-45%	-5%
Dieselisation of the fleet	+11%	+13%	-2%
Evolution of the composition of the fleet (types of vehicles)	+3%	+6%	+4%
Total change in emissions	-30%	-35%	-13%

Impact of the Low Emission Mobility Zone (ZFE-m) of the Greater Paris Metropolis

Mobilise Your City

Impact of the Low Emission Mobility Zone (ZFE-m) of the Greater Paris Metropolis

ZFE-m: a system aimed at prohibiting the most polluting vehicles from entering a certain area. Indirectly, this measure aims to accelerate the renewal of the vehicle fleet, and is accompanied by financial aid to help the most vulnerable households and companies to change their vehicles.

In force in Paris since 2016 with a gradual reinforcement step by step:

.

Extension to the Greater Paris Metropolis.

Airparif: assessment of the impact of the entry into force of the ZFE-m on

- Emissions
- Concentrations
- The exposed population

According to different scenarios: perimeter and restriction level (Crit'Air stickers).

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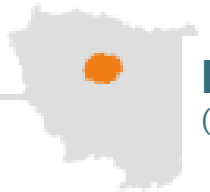
Impact of the Low Emission Mobility Zone (ZFE-m) of the Greater Paris Metropolis

2nd stage (January 2021)

CRIT'Air : NC 5 4 3 2 1



Intra A86 area
(outside Paris)

-3%
OF MOST POLLUTING VEHICLES

KILOMETERS DRIVEN

=

-8% NO_x
-4% PM_{10}
-6% $PM_{2.5}$

EMISSIONS RELATED TO ROAD TRAFIC

=

-50 000
METRPOLITANS

EXPOSED TO LEVELS THAT EXCEED REGULATIONS

AIRPARIF

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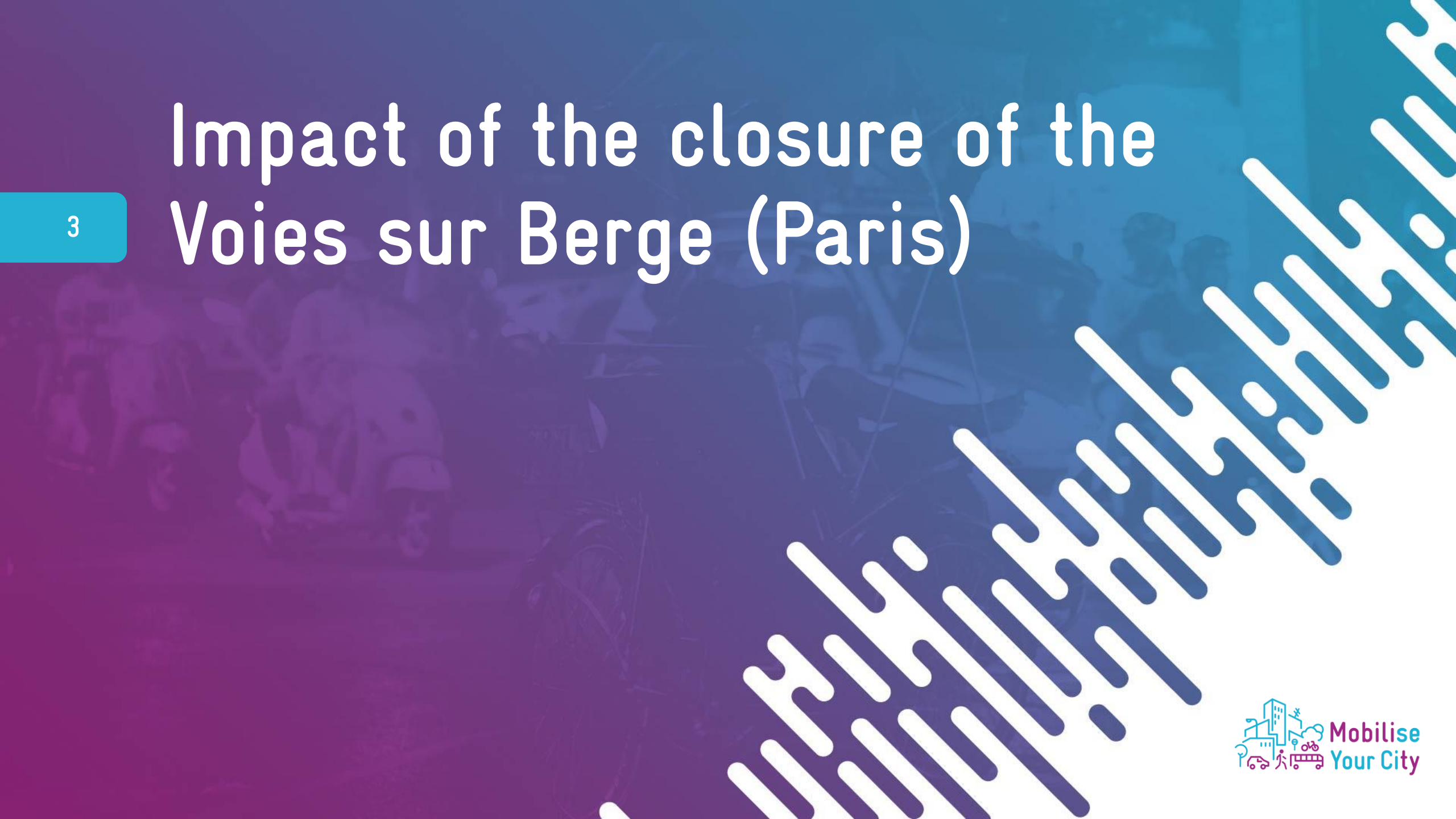
Impact of the closure of the Voies sur Berge (Paris)



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Impact of the closure to traffic of riverside lanes, Paris

2016: closure to traffic of the Georges Pompidou Way, an urban freeway along the Seine, over 3.5 km

Specific study to evaluate the impact of this closure on air quality.

Methodology:

- Assessment over a large enough area to account for deviated traffic
- Pollutants: NOx-NO2, PM10 -PM2,5, Benzene
- 2 monitoring campaigns (winter/summer) to reproduce annual levels - 80 monitoring points, including one every 300 m along the riverside lanes.
- Modeling to reproduce pollution variations over the entire urban area, in relation to traffic evolution.
- Precise information on the traffic and the typology of the roads

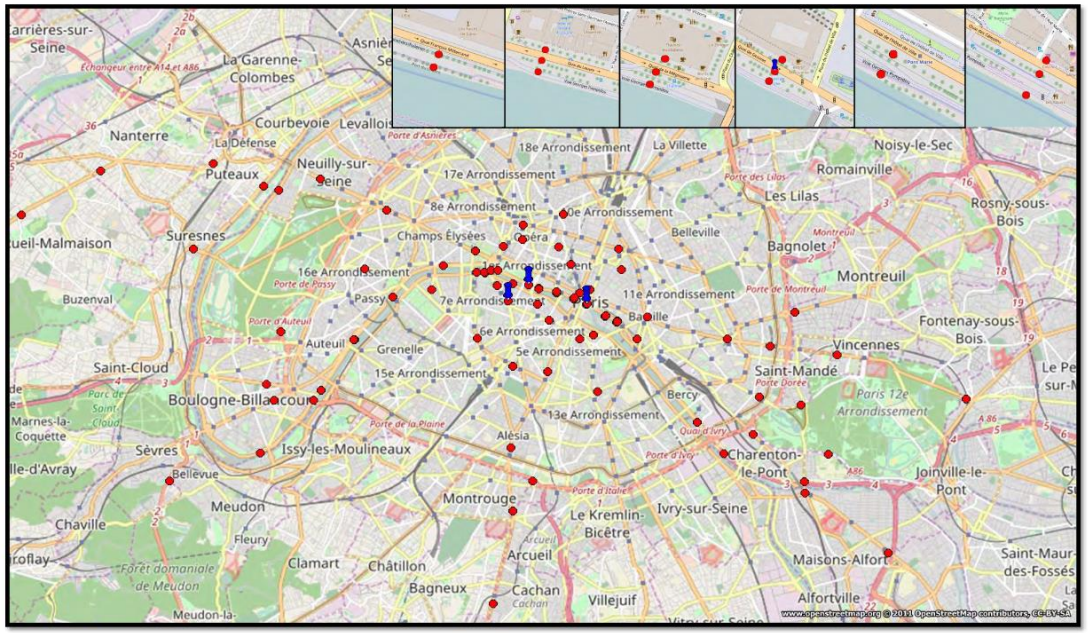


Figure 7 : plan d'échantillonnage de la campagne de mesure

Impact of the closure to traffic of riverside lanes, Paris

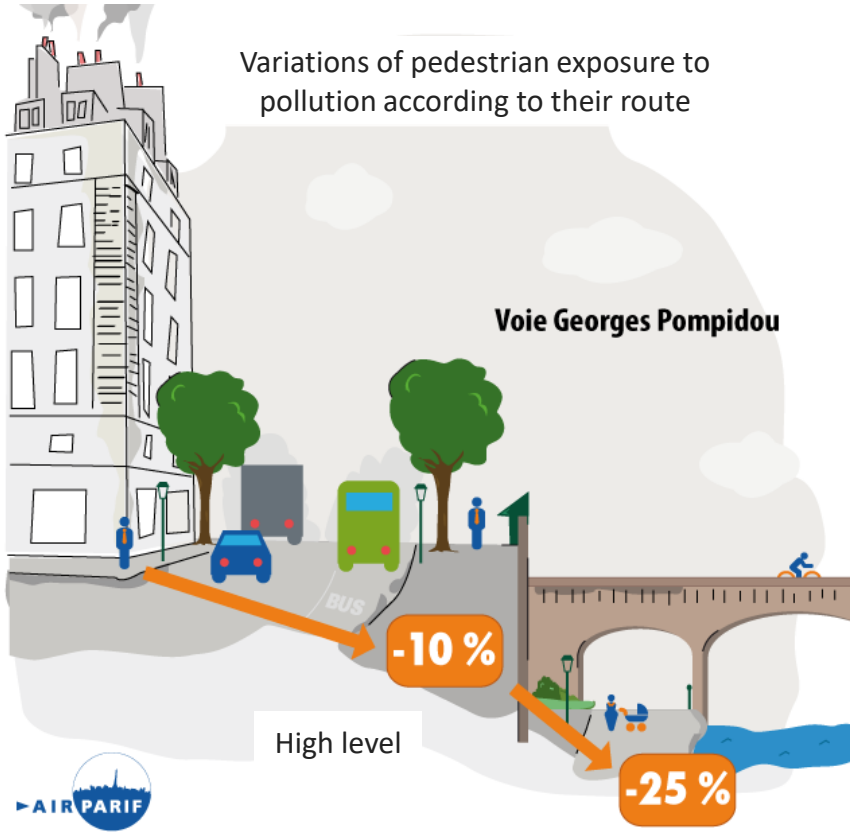
Impact of inhabitants' exposure to NO2

More or less marked along the riverside lanes depending on three factors

- the number of vehicles;
- the traffic flow;
- and the road topology.

On the low banks closed to traffic, the exposure decreases by up to -25% compared to the exposure along the traffic flow.

On high banks open to traffic, exposure drops by up to -10% compared to the traffic flow.



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Impact of the closure to traffic of riverside lanes, Paris

Impact on concentrations (NO2) :

- Improvement of air quality along the quays closed to traffic (up to -25%)
- More or less marked deterioration around junctions in the area and to the east of Paris (up to +15%)
- Perceptible impacts on some transfer routes (from +1% to +5%)
- Greater impact during the morning traffic peak

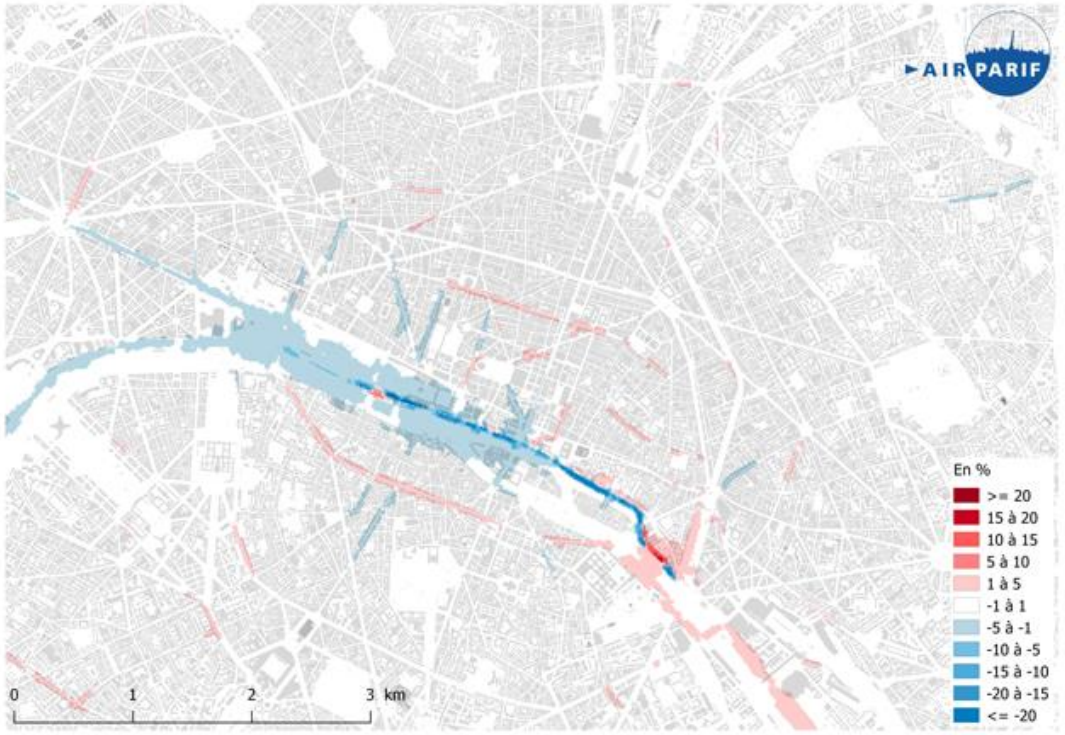
-> Need to anticipate traffic shifts, which can lead to a local increase in concentrations.

(Even if they are generally on short/medium term).

-> In summary: A localized improvement along the axis.

Overall in Paris, no change in the general exposure of Parisians (up or down).

Co-benefits of closure: calmer living environment, reappropriation of public space by inhabitants for sports, cultural and recreational activities... (quantification outside the scope of this study).



Difference map between average NO2 levels before and after the closure, assuming constant meteorology.

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Bus emission measurements in real traffic conditions

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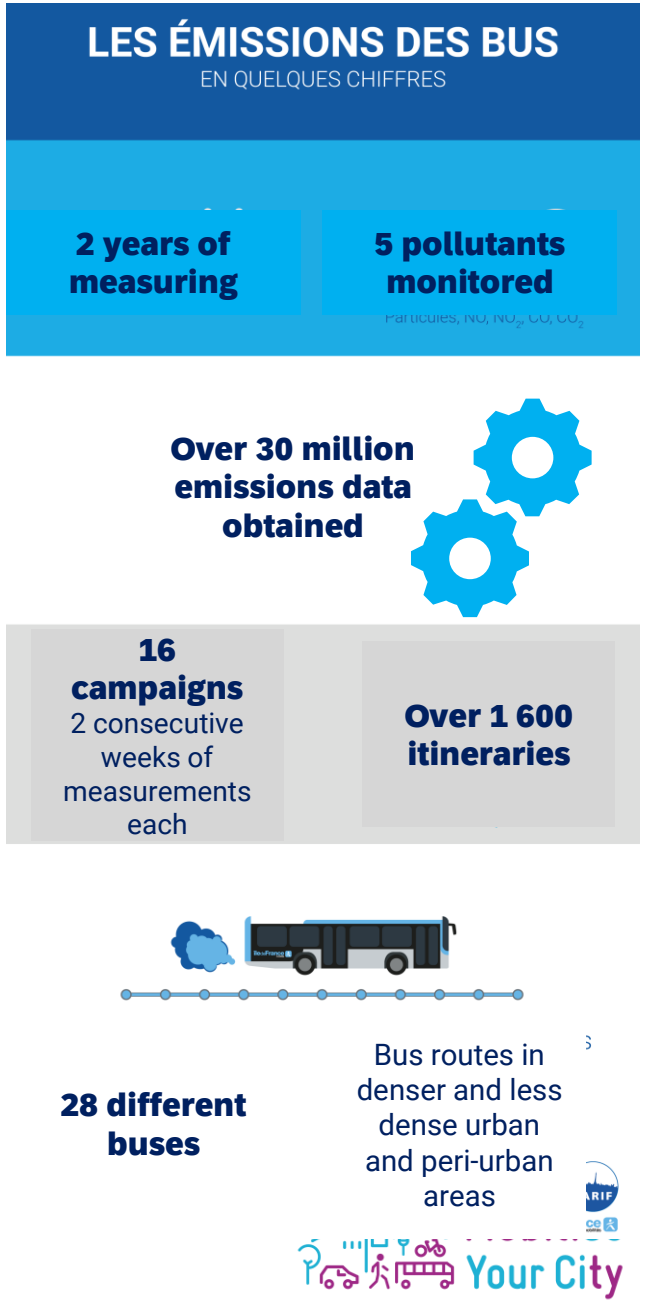
Bus emission measurements

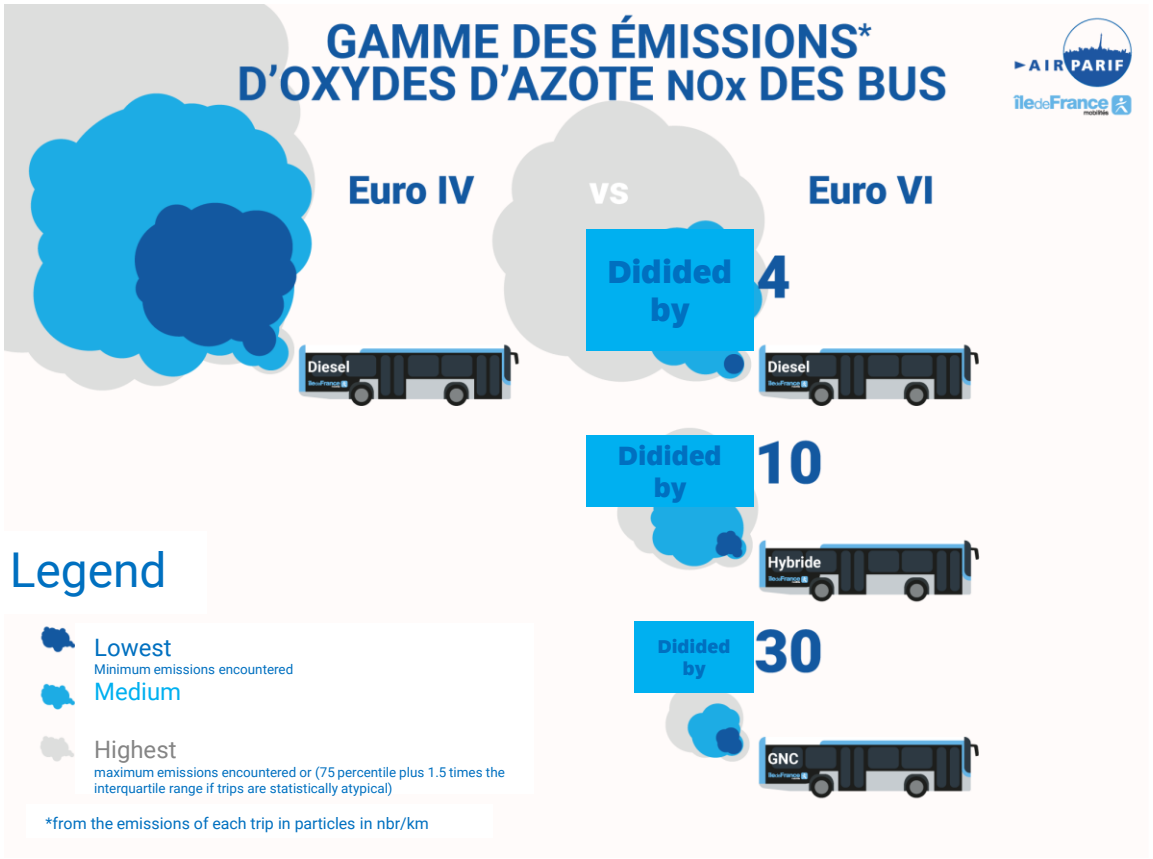
Study conducted by Airparif in partnership with Île-de-France Mobilités (regional transport operator):

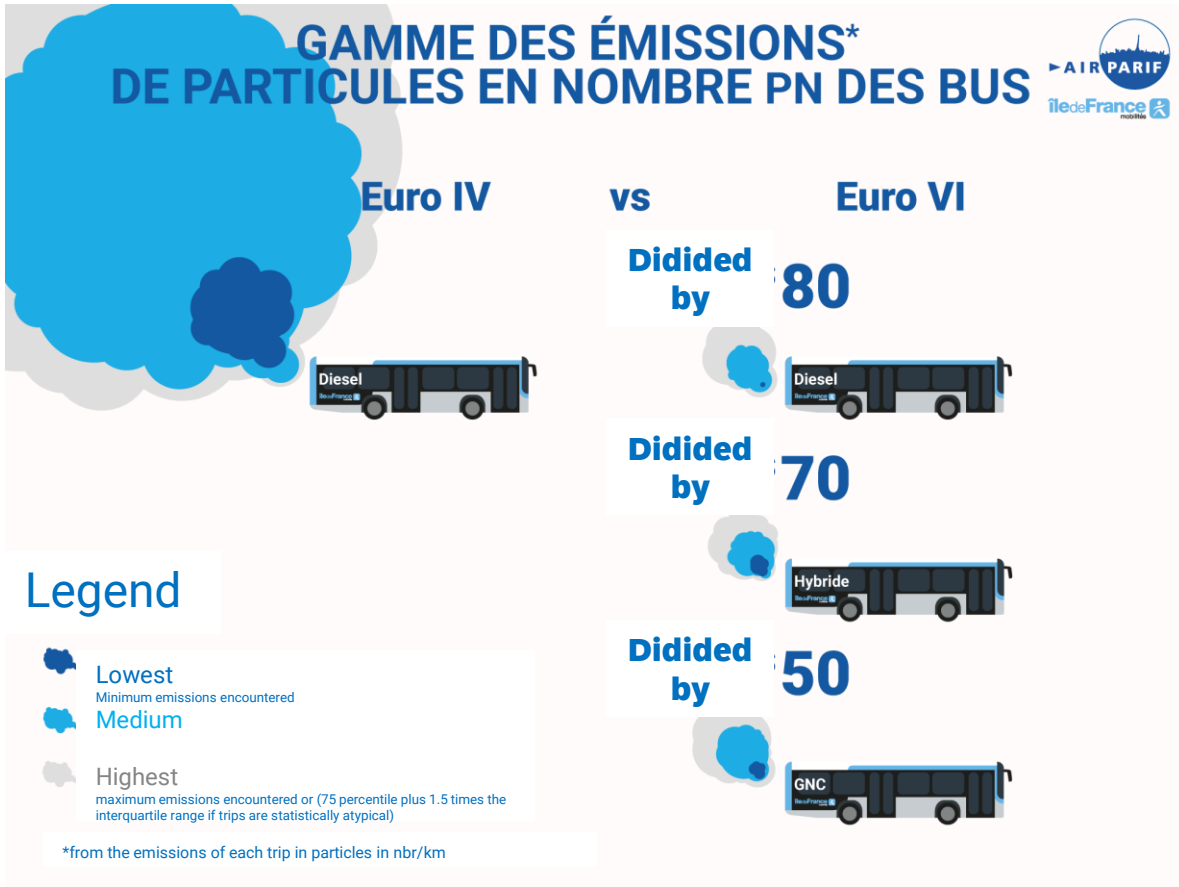
Measurement of pollutant emissions from buses under real operating conditions, with different Euro standards and different fuels/motors (diesel, hybrid, NGV).

Objective: to improve knowledge of emission levels by type of bus in real conditions, to evaluate the impact of the technological renewal of the fleet and of certain influencing parameters (speed, cold start).



Bus emission measurements





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Cycling development policies

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Cycling development policies

As part of the City of Paris' 2015-2020 Bicycle Plan, significant development of bicycle facilities, with a recent acceleration linked to the health crisis (temporary facilities: "corona-pistes")

- > 1000 km of cycle lanes in 2021 compared with 200 km in 2001
- Objective of the 2021-2026 Bicycle Plan: 100% cycleable city (new lanes, safer junctions, parking spaces).

What impact does this policy have on air quality?

Difficult to determine because to know the gains in emissions, it would be necessary to know precisely the modal shift:

- Did the new cyclists use public transport? Their private vehicle?
- In the absence of specific surveys on modal shift, evaluation method: modal shift is done pro rata to the share of the different modes of transport

-> If 50% of journeys are made by car, we consider that 50% of new cyclists are former car drivers (with weightings according to distance, type of road, etc.)

Cycling development policies

What we do know how to estimate, however, are the gains in terms of individual exposure:

- Cyclists are less exposed than motorists or public transport users such as buses
- Their exposure varies according to the type of development. From most to least exposed :
    - Traffic flow (no development)
    - Road markings
    - Bus lanes
    - Cycle tracks

-> Cycling development policies have a double impact:

- Lower emissions (difficult to quantify)
- Reduction in exposure (well known depending on the type of development.

ranking of facilities according to cyclists' exposure to pollution from most to least favourable

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Impact of lockdown on air quality

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Impact of lockdown on air quality

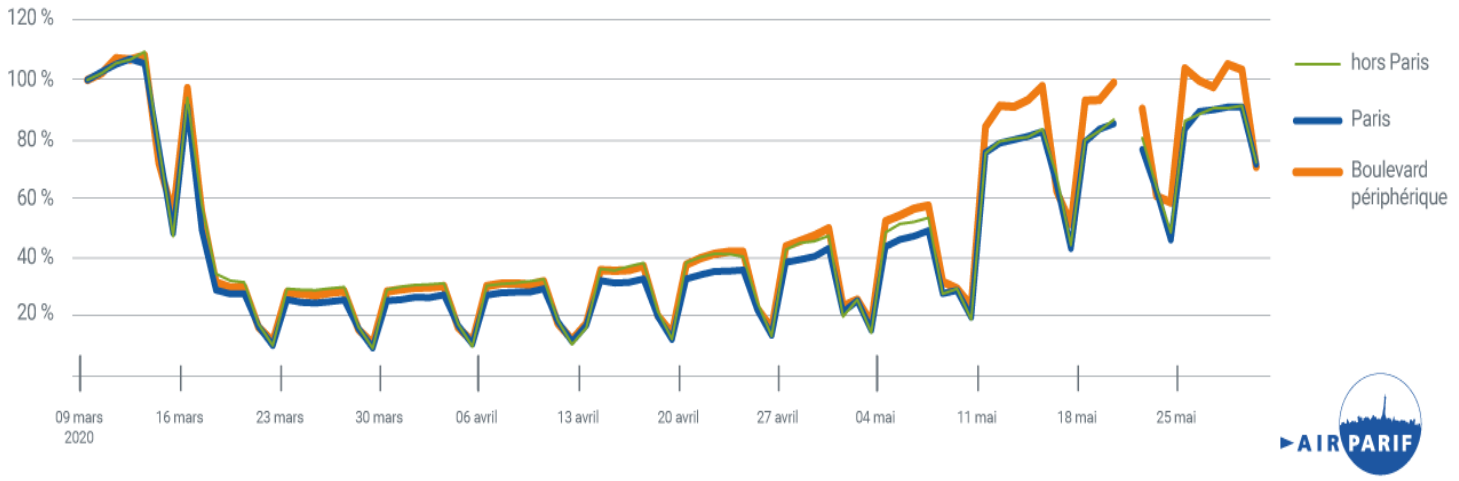
Lockdown: not a traffic reduction measure as such, but a kind of "natural experiment" that allowed to evaluate, in real conditions, the impact of an unprecedented decrease in road traffic on pollution levels:

Up to -70% traffic during the spring 2020 containment

Up to -70% of traffic-related NOx emissions

A rapid return to normal after the lockdown.

Daily nitrogen oxide (NOx) emissions in Île-de-france
compared to March 2020



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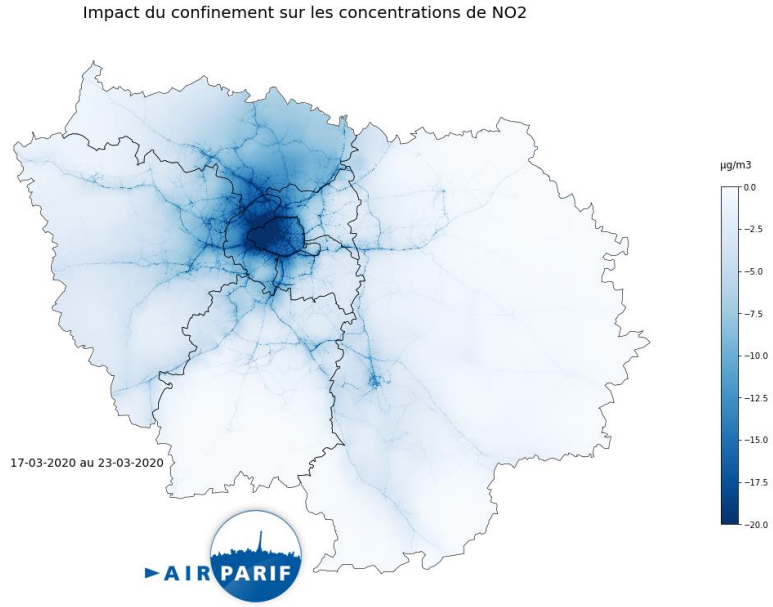
Impact of lockdown on air quality

- First lockdown: Drastic reduction in traffic-related emissions, which led to real gains in air quality (concentrations), particularly for NO2 (between -20% and -30%, and up to -50% along the main roads)
- A much more limited impact on particulate matter (-7% in concentrations): concentrations very much influenced by meteorological conditions (not very dispersive), and numerous non-traffic sources that were not impacted by the containment (agriculture, heating including wood heating)

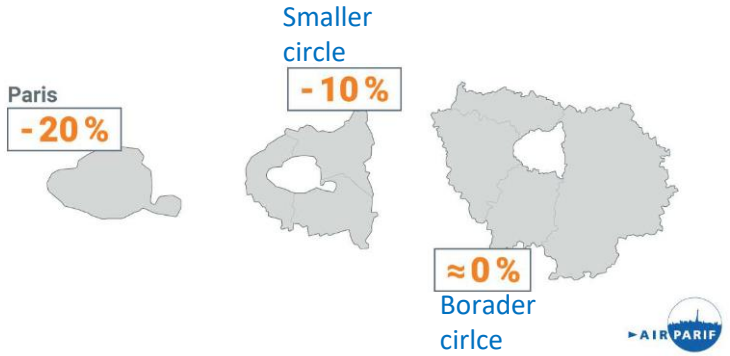
-> An episode of particulate pollution was observed on 28.03.2020, when the Île-de-France region was experiencing an unprecedented drop in road traffic.

- Weather conditions favorable to the formation of secondary PM
- Agriculture and heating (including wood) : no impact of lockdown
- <u>Mean impact of Covid-related restriction measures over 2020</u>
- Greater impact for the 1st lockdown (stricter restrictions)
- Greater impact in the heart of the agglomeration due to traffic and residential density

-> Even if we drastically reduce road traffic emissions, we will not completely eliminate air pollution because of the contribution of other sources.



IMPACT OF RESTRICTION MEASURES RELATED TO THE SANITARY CRISIS IN 2020 for nitrogen dioxide background pollution



Conclusion

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Conclusion

- Mitigation measures to fight air pollution offer real results (some with win-win emissions + exposure)
- To assess this impact accurately :
  - Knowledge of the vehicle fleet, the road network, traffic conditions, traffic emissions
  - Reference stations + Modelling tools and/or measurement campaigns
- Be careful to anticipate and limit traffic transfers
- Co-benefits: calmer living environment, noise pollution, safety for pedestrians and cyclists (virtuous circle for soft mobility).

Thank you for your attention!

Keep in touch

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