Faced with air quality issues, what are mobility stakeholders doing? PART 1

Every year, air pollution is responsible for at least 48,000 premature deaths in France, due in particular to fine particles released into the atmosphere, but not only them. Today, if air pollution is associated with health risks, many mobility players and start-ups are innovating to find effective and sustainable solutions. To understand everything about air quality issues, Madines presents this new program on the occasion of International Car Free Day.

Hello everyone and welcome to Common Frequencies. And when it comes to the issue of air pollution, everything is far from simple. What do we breathe? Where does this pollution come from? To talk about it, I am with two experts on the subject.

Thank you so much for being with us. Hello Pierre Pernaud. Hello.

So you are an engineer and director of communications at Air Paris. Hello Eric Calais. Hello.

You are Director of Innovation and Industrialization at Keolis, a major international player in public passenger transport. First question quite simple, when we talk about air pollution, what are we talking about concretely? We are talking about substances that are found in the air that we are going to breathe and these substances in fact have an impact on health. They can come from sources of pollution that are emitted by man but also sometimes by nature, and so these substances will be nitrogen oxides, the fine particles that you mentioned, ozone and then other pollutants that are also more emerging, such as ultra-fine particles for example.

Where do these particles come from? So it's particles in particular, they come from transport, they come from heating, they can also come from industry, agriculture, construction sites and sometimes also from natural phenomena such as volcanic eruptions or even sand rising from the Sahara. What is the share of this pollution caused, for example, by cars or industry or heating? So it's particles in Ile-de-France, pollution linked to road traffic represents about 20% of emissions while for heating, it's almost 50%. And on heating, it is essentially but really in the vast majority wood heating that will emit these particles.

An important point of precision, however, is that it is really on the side of the roads that we will have the highest levels of particles. So it's really very important to act on both these sources, heating and road traffic, to combat particle levels. That is to say, for example, when I am on the side of a motorway or a busy road, that's when I'm most exposed to fine particles, to sea pollution.

That's exactly it. This is where you are exposed to the highest level of particulate matter. These levels can sometimes even exceed the regulations, even well beyond the recommendations of the World Health Organization because somewhere, there is a concentration of sources of pollution with cars, with trucks and that will generate significant levels of pollution.

So I imagine that means that we should give priority, or at least encourage, to public transport. I say that obviously for Éric Calais. In any case, you know at Keolis that this pollution is very important along road traffic and that the car is necessarily to blame.

We won't go that far, but indeed the heart of our job is to offer alternatives to solo driving, that is to say to find myself alone in my car. So we do that in 14 countries, we have 68,000 employees and I think we transport 12 million people a day with things as variable as the trams in Manchester and the buses in Châteauroux. What do we breathe when we talk about air pollution? Much has been said about NOx, which I believe is produced by internal combustion cars, especially diesel engines.

There are several kinds of fine particles, they are said to be the size of a hair. Yes, so there are many kinds of particles. In fact, particles can be characterized by their size, but also by their chemical composition, and sometimes even by their surface area, for example.

So if we look at what we call fine particles, in fact, these are the particles that we call PM2.5, that is to say all particles that have a diameter of less than 2.5 microns, so it is a diameter that is even smaller than a hair. You don't feel them when you breathe them. You don't already see them and you don't necessarily feel them when you breathe.

And these particles, they will penetrate the respiratory system, in particular the entire upper system will be quickly seen and it will actually arrive in the lungs. And these PM2.5 will have the particularity of passing into the pulmonary alveoli, of being able to pass into the blood and in particular also raise questions at the cardiovascular level. We often talk about the car as a source of pollution, in particular we are increasingly talking about the production of brake dust, tire dust.

Is this precisely what this dust is about, these fine particles PM2.5, PM10 that you are talking about? In fact, a car, when it drives, it will emit particles in two different ways. Either combustion, so it's the engine and particles that will come out of the exhaust pipe, so that's true for combustion vehicles, or it's going to be abrasion. And what is abrasion? It's the friction of the tires on the road, it's the friction of the brakes too and so that's going to emit abrasion.

This abrasion part, in fact, is becoming more and more important, not that it increases it in itself, but it is the combustion part that is actually decreasing, because there have been a lot of regulatory requirements, it is the famous euro standards that aimed to reduce the share of combustion. There have been evolutions, innovations on the combustion engine that could reduce the engine. That's it, because there were broadcasts.

For example, the best known is the particulate filter, which has made it possible to reduce particulate matter emissions. So we end up with particles linked to abrasion, which are roads, tyres, brakes, which will be increasingly important in relative proportion to overall particle emissions. They have not increased from an absolute point of view.

For example, on PM2.5 in Ile-de-France, we are still at about 1000 tons per year. But these 1000 tons per year of abrasion particles, before they represented 20% of particles related to road traffic, now they represent more than 50%. So there is now an increasingly strong challenge to work, in fact, to reduce this source of abrasion-related particles on which, for the moment, but this may change in the future, there is no regulatory requirement to reduce emissions.

Eric, what is it in the end that the car is the focus of all eyes when it comes to limiting the production of pollution? What Pierre was saying is that there are a lot of cars today compared to public transport networks where there are far fewer vehicles or compared to bicycles or smaller things. So one of the points that we have a lot in cities is that there are a lot of cars and a lot of cars for not many people. Whereas when you look at the flow of bicycles, the solarium of the volis or the filling of the buses, in the end, we will transport a lot of people.

A bus will also produce dust, but as it will be fuller, the impact will be much, much lower. That's still a problem today, the fact of this number of cars, the solid car. Often, we are alone in the car, at least we see it in the big French cities.

There is often only one driver. Is that a real issue when we talk about air pollution? This is already a subject for the driver because it must be remembered that on the surface, it is the motorist who is subject to the highest level of pollution because generally, you are in a flow of vehicles with a car in

front of you and the air intakes of your car, they are just in front of the exhaust pipe of the car in front of you. In the passenger compartment alone, in fact, there is a level of pollution that is greater than if you are on your bike or on the sidewalk next to it.

Even on a bike, you could say that you're still in traffic. You are in a place that is ventilated and then generally, for other reasons and we can only advise it, in particular safety reasons, more and more when you are on a bike, you try to take the cycle paths and you also finally get away from this flow of traffic which is also a very polluted place. So, there is already a real health issue to reduce this exposure to pollution.

And then, there is an issue of changing behaviour precisely to try to favour soft modes when possible, especially over short distances and then try to avoid, as it was said, using the car alone if possible because in the end, it makes the show expensive for only one person. Eric, what are we doing today to limit this impact of pollution? Is it possible? I think everyone is doing their part in this. We, indeed, at Coalice, our subject is to make the most efficient transport networks possible work so that people feel good and therefore take them with pleasure, so that people can also find, there are cities like Dijon for example, where we have several modes, there is the tramway, The bus, the bike and people will be able to make cocktails with these different types of mobility to find more alternatives to "I took my car in the morning and I bring it back in the evening". So, that's really that part, doing something interesting, and we're also working on how to design a network, that is to say in such and such a place, this line, it deserves to be extended because all these people, in the end, could no longer take the car and come either to join another tramway, or stay on that bus and no longer need the car.

These are really the subjects we are working on. So, it's really encouraging actually for you, it's encouraging you to leave your car aside to take public transit. That's right.

Offering the most pleasant, fluid and efficient alternatives possible because they are public transport is also a way of going faster. So, this is really a very current issue since we saw it this summer with global warming, the frequency of heat waves is necessarily increasing. In fact, how does this heat wave create even more air pollution or does it create more of it in the first place? Yes, in fact, with the evolution of the climate and this global warming, we expect pollution levels to increase, in particular either with fires or with the increase in heat waves as you mentioned, particularly for a specific pollutant, which is ozone.

So, ozone is a somewhat complicated pollutant because we are not going to emit it directly, but it is other pollutants that are nitrogen oxides and volatile organic compounds which, under the effect of heat and sunlight, will form ozone. And more sun, more heat, it potentially means more ozone tomorrow. So there is a real, real, real challenge in further reducing our sources of pollution, i.e. the sources of nitrogen oxide and volatile organic compound pollution in order to be able to limit the impact of future heat waves in the future.

What are we doing, in fact, to reduce these sources of pollution? Is this issue really being tackled head-on by governments, cities and metropolises? Do we feel that the subject is there, Éric Calais? Yes, clearly, not only is everyone talking about it, but everyone is working on it. We work for a number of mobility authorities, in fact local authorities who are committed to having a transport system that is as efficient as possible, for many reasons, but also for many others. So, that's really one of the points because people will feel good, because everyone will be able to move.

A transportation system that doesn't work can also mean people who will stay at home when they could be getting around, doing things, seeing their families, etc. So, these are really points where pollution is an element, but overall, a well-functioning transportation system is really something that

is beneficial for the territory. Pierre Perdot, you also have this feeling that we are looking at this problem more and more, we are paying more and more attention to it.

So, this is one of the first environmental concerns of the French and the people of the Ile-de-France region. So citizens are very concerned about this subject. Scientific knowledge on this subject is increasingly important and, for example, in September 2021, the World Health Organization reviewed all its air quality recommendations and some of these recommendations were divided by four.

This means that we have realized that air pollution has an impact on health in even lower concentrations than previously imagined. And behind that, there is a tiny bit of pollution that can have an impact on health. In fact, you have quite a few pollutants, especially particles, where there is no so-called threshold effect, that is to say, any microgram gained is good to gain.

There is no concentration where we say to ourselves that we are careful, dangerous, and underneath, we tell ourselves everything is fine. So, there is a real, real challenge, in the end, to continue to reduce pollution emissions and therefore to have better quality air. So, that's a first point.

And then, we must also remember that, as was said, there are actions to be taken at all levels, whether at the European level, in particular with European regulations, at the level of the State, at the level of local authorities, at the level of actors and at the level of citizens too. And what does that mean? This means more demanding regulations, it means actions, particularly on mobility at the level of local authorities, as can be put in place, for example, with the low-emission zones for the Greater Paris metropolis. It also means that the State provides regulatory frameworks to allow these actions.

And then, it also means more and more that the actors can raise awareness of these air quality issues. That's what we're trying to do at Air Paris. This is what we also try to do with several partners and so that people can change their behaviour so that they can have better health with better quality.

Is this awareness enough? Because we know the recommendations for better air quality, ADEME says it every time, it's walking, public transport, cycling, soft mobility in general. I ask you these questions, Eric. Do we have the feeling today that there is a real awareness to bring people to public transit, for example? Yes, overall, I think that the summer we have just spent has also given us the... Shocked, already.

Shocked, yes. So, at first shocked, then also, he told us again that it was important to take care of it and that the solutions had to be as effective and pleasant as possible. So, yes, I think that there is indeed a real consideration.

After that, it's a work with lots of small steps, lots of pieces, lots of subjects to be dealt with almost separately so that at each level, everything works better. There should be no more results, already. Finally, in the Ile-de-France region, Air Paris has noted an improvement in nitrogen dioxide concentrations, in particular.

What's the matter? For 20 years. There is the reduction of sources. There is the drop in traffic.

There is the fact that we have vehicles that are less polluting too. That's right. There are standards on industry and then there is also de-instabilization, but we have also had industrial emission levels that have fallen sharply, sharply.

And this is not only in the Ile-de-France, it is also what all observers of air quality in the regions are noting. On the other hand, we cannot be completely satisfied with this because, as I was saying, we are still beyond the regulatory limit values. Moreover, France can be condemned by the Court of Justice of the European Union on this point.

Can, because it is above a procedure and it is ongoing. And we are well, well above the new recommendations of the Health Organization. So, there is improvement.

On the other hand, we can't completely satisfy. This is not completely enough and we must continue to act on this. So, there was a lot of talk about the car, obviously, about solo driving, which was not at all encouraged if we want to reduce air pollution.

The electric car is also referred to as something miraculous. Except that on air pollution, if I understand correctly, it doesn't work at all in fact. So, it's not that it doesn't work, it doesn't take away the abrasion part of the particles because you still have tires, you still have brakes, everything that serves as brakes, they're going to be there.

It takes away the combustion part and it's not zero. So, there is no NOx in fact. There is no NOx and there are no combustion particles.

And that's not bad. What for? Because I will just remind you that diesel particles are classified as carcinogenic by the Cirque and petrol particles are classified as probably carcinogenic by the Cirque. Le Cirque is the international centre for research against cancer.

So, there is a real challenge in eliminating this type of particles from the air we breathe in the city. On the other hand, the electric car can't be a miracle solution completely. What for? Because you still have these abrasion particles, there are real health issues too.

And then, there are energy issues behind making them work too, which are not necessarily neutral in environmental terms. Of course, there is a lot of talk about public transport. I'm thinking in particular of the metro, Éric Calais, they say yes, I'm going to take the metro, but sometimes I'm told that the air is more polluted than outside.

Is this also an issue that needs to be addressed? Yes, that's what I was saying earlier, we have to take care of everything. We need to put in buses that will have newer engines, which will pollute less. We have to look at what is happening, measure and work in underground enclosures and typically in metro stations to improve air quality in these places as well.

And then, you have to work on all the different stages. That's what Pierre said. It's really a global job.

And you do. First of all, the measure, I think it's very important for... Yes, we really do this with the local authorities for whom we work. We start measuring because that's how we're effective.

We will work more on places where we are more polluted than on places where we are less. So that's a first point. How does the measurement work? Measurement is sensors.

So Air Paris and its colleagues have been doing this for decades. There are things that are a little smaller now, but we install sensors in a metro station, in a place to measure the air quality throughout the day, which also allows us to know if it's worse when the metro arrives, if it's worse when it leaves. What are the phenomena? This will allow us to analyse a little bit of what is happening.

Do you agree with that too, that when the general public wants to take public transit, to go in the metro, that there can be a little bit of this false or not totally true idea of higher pollution? There are levels in particular, as was said, in the metro, in the AER, which are important. Because it's closed. Because it's closed and because, as has been said, we have rolling stock that will emit particles, again through the phenomenon of abrasion, especially from the brakes.

There is no engine yet. We're on electric motors, so it's brake dust. There can be significant levels of particles.

There are real challenges in reducing these levels of particles, as has been said, in particular with the renewal of rolling stock and potentially through pollution control systems. And the challenge is to evaluate these pollution control systems. And this is where we come back to the importance of the measure.

That is to say, to know if it works, you have to measure well, you have to observe well. Everything that cannot be measured does not exist, we are used to saying. As a result, you, Eric, also feel that this is a problem that is addressed by the agglomerations, by the big cities, which call on your services.

Very clearly. We work with them on the three aspects, measuring, reducing emissions and then removing a little in an open innovation theme. Open innovation is really something that is our way of working on subjects like this.

These are subjects where we can't say, it's the big company that will take care of everything from start to finish. We have to work in an ecosystem with different players, with startups, with research laboratories, with universities, to find the right solutions and then to build them together. Has there been this awareness of public transport on the part of urban areas for a long time? On the vehicles that are outside, I think it's been a really long time.

All the euro standards on the subject have evolved. It must have been at least 10 or 20 years. Afterwards, in the underground enclosures, I think it's a little more recent, but it must have been at least 5 years, that's pretty clear.

Yes, there are real issues at stake in this. We were lucky enough to work with the Regional Council of France and France Mobilité on these subjects, in particular by launching calls for innovation in distribution systems to see what could be done and to be able to evaluate them. After that, it's not easy because first, you have to know if the system is effective from a pollution point of view and then, you have to know if the system is operational because in a metro station, you have space issues, you have safety issues.

You also have issues with water use, which can be important for pollution control systems. And you also have noise issues for the comfort of users, but also for safety issues. For example, all messages and audible warnings must be heard by everyone.

So these are real, true, real questions and we continue. Moreover, the Île-de-France region has just launched a new call for experimentation for the metro and the URR in Île-de-France, in which we are participating with our open innovation platform called AirLab, to finally be able to continue testing pollution control systems that can be either air treatment systems, or particle suction or particle trapping systems, especially in tunnels. Because in fact, there is a big, big issue in the tunnel, because the air we breathe on the platform is the air that comes from the tunnels when the metro arrives.

As a result, we know that pollution control systems work. They are currently quite embryonic, but they exist. There are already many innovations to try to limit both the production of fine particles and their impact.

We'll talk about it in a moment, in a second part of the show. Thank you both for coming to this program, Common Frequencies. Thank you Pierre Pernaut and thank you, Éric Calais.

Thank you.