August 29th, 2024

Situation and levers for action concerning ozone in the Auvergne-Rhône-Alpes region

12th YANG TZE RIVER DELTA CLEAN AIR FORUM

Speaker

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Deputy Director

Atmo
Auvergne-Rhône-Alpes

SUMMARY

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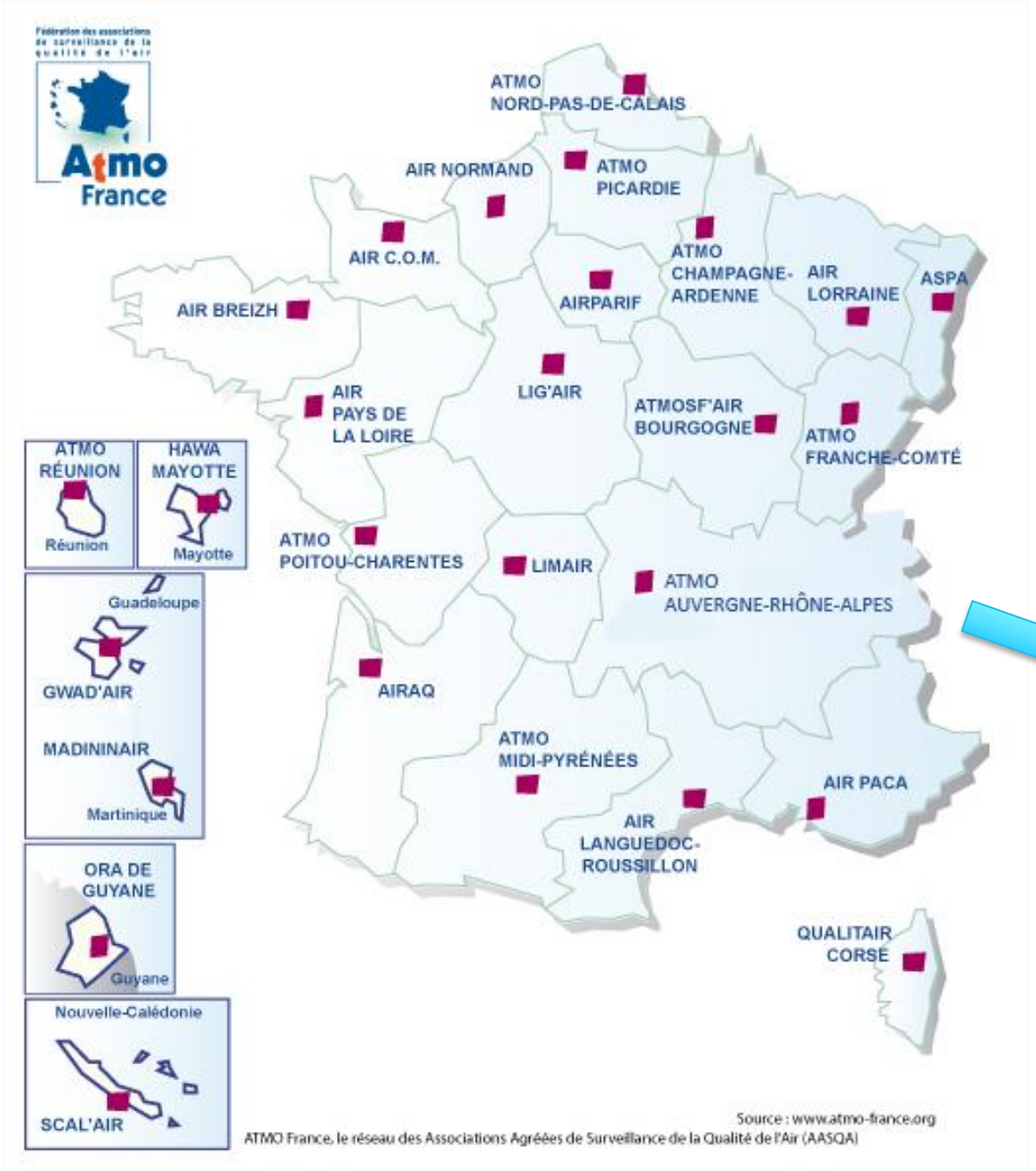
1

AIR QUALITY MONITORING IN AUVERGNE-RHONE-ALPES REGION - FRANCE

A nationally coordinated monitoring system

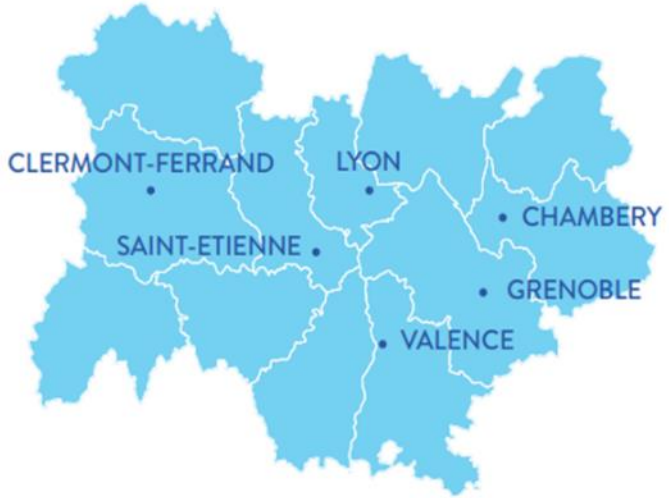


The ATMO federation unites certified Air Quality Monitoring Agencies in France (AASQA)

Non-profit organisations (law of 1901 or 1908)

Certified by the Ministry of Ecology, Sustainable Development, and Energy

- **500 experts in France**



Atmo votre parten'air AUVERGNE-RHÔNE-ALPES

Auvergne-Rhône-Alpes, a region full of contrasts

No.1 industrial region
in France

2nd largest tourist
region in France,
after Ile-de-France

85 % of the population
lives under the influence of a major urban centre

22 % of the Auvergne-Rhône-Alpes region falls within one of the nine Natural Parks

8 millions
Inhabitants
higher degree of urbanisation than the French average

70,000 km²
surface area

The challenges to overcome

- **Take action** to ensure better air quality in over-exposed areas (large urban centres and major trunk roads)
- **Rehabilitate** sensitive zones
- **Maintain** protected natural areas in order to sustain continued economic attractiveness

A consultative body split into 4 colleges

- 220 members

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ATMO Auvergne-Rhône-Alpes has 5 missions

The observatory's work fits into the Regional Air Quality Monitoring Plan (PRSQA), in accordance with the National Air Quality Monitoring Plan (PNSQA)

parten'air AUVERGNE-RHÔNE-ALPES

Regulations

A global framework

- The Geneva Convention
- WHO recommendations (2021)

European objectives

- Göteborg protocol
- Emissions Directives (IPPC, LCP, ENC) and ambient air (2008/50/CE, 2004/107/CE)
- Ambiant air (2030 objectives)
- Zero pollution objective (2050)

French regulations

- LAURE law of 1996 and decrees
- Grenelle Environment Forum (2010)

Local measures

- Regional Climate-Air-Energy Scheme (2011 – 2030)
- Revised Atmosphere Protection Plans (2027)
- Air Climate Plans for agglomerations/territories
- Regional ozone plan (2021)

What is the situation regarding O_3 issues in the AuRA region ?

Regulations under review

	Paramètre		Actual european regulation Valeur réglementaire européenne actuelle	WHO 2021 Seuils OMS 2021	Draft european directive Projet de révision Directive * Seuils visés en 2030
DIOXYDE D'AZOTE NO_2	Moyenne annuelle		Valeur limite 40 µg/m³	10 µg/m³	20 µg/m³
PARTICULES PM10	Moyenne annuelle		Valeur limite 40 µg/m³	15 µg/m³	20 µg/m³
PARTICULES PM2,5	Moyenne annuelle		Valeur limite 25 µg/m³	5 µg/m³	10 µg/m³
OZONE O_3	Nb de jours de dép. de la moy. glissante	120 µg/m³ sur 8 heures	Valeur cible 25 jours par an	-	18 jours
		100 µg/m³ sur 8 heures	-	3 jours par an	-

上海市环境监测中心
SHANGHAI ENVIRONMENTAL MONITORING CENTER

A FRIENDSHIP EXCHANGE SINCE 2017
3 visits for SEMC and 2 for Atmo

Current work programme

- 3 major themes that are important to SEMC and ATMO
- guide collaboration over the next 3 years
- extends work on air quality to include climate issues and carbon neutrality
- expert exchange in preparation

These 3 topics will be developed :

- **GHG MONITORING**
- **OZONE ISSUES**
- **INDUSTRIAL MONITORING**

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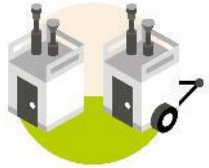
AUVERGNE-RHÔNE-ALPES

Chamonix, July 12th, 2023

The monitoring system



NETWORK OF ONGOING MEASUREMENTS

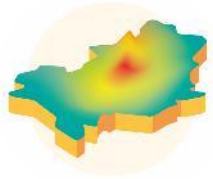
- European directive and environmental code
- 84 fixed stations
- 24 hours a day/7 day a week

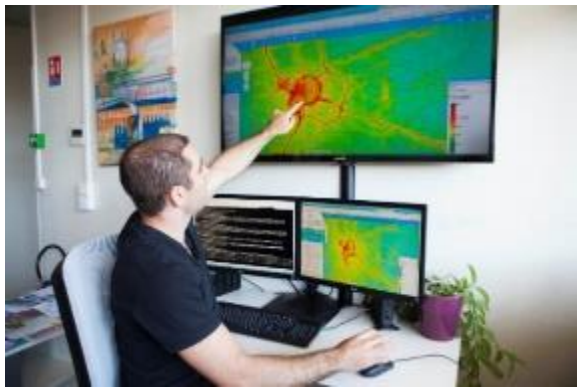
MEASUREMENT CAMPAIGNS

- European directive, the environmental code and local/regional needs
- Mobile laboratories

MODELLING & MAPPING

- Short-term forecasts
- Annual analysis
- Forward-looking scenarios





EMISSIONS REGISTRY

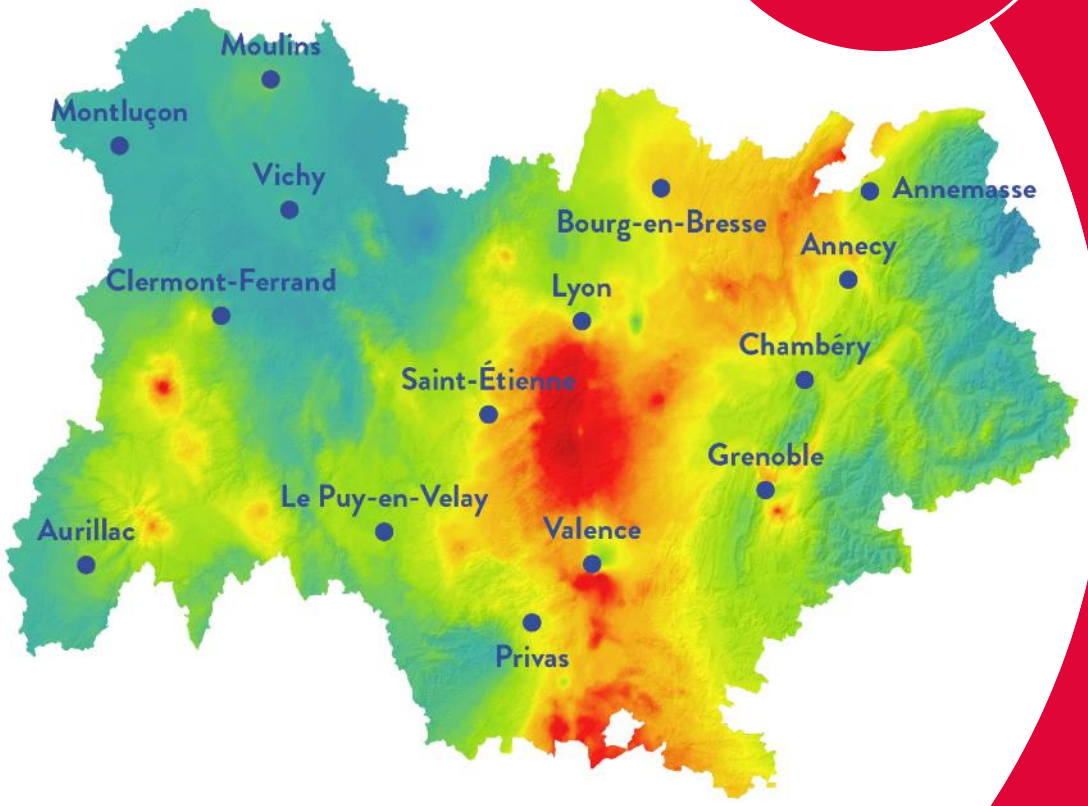
- Simulation/ forecasting
- Decision aids, forward-looking scenarios

COMMUNICATION

- Inform
- Support action
- Incite changes

2

OZONE
A COMPLEX ISSUE



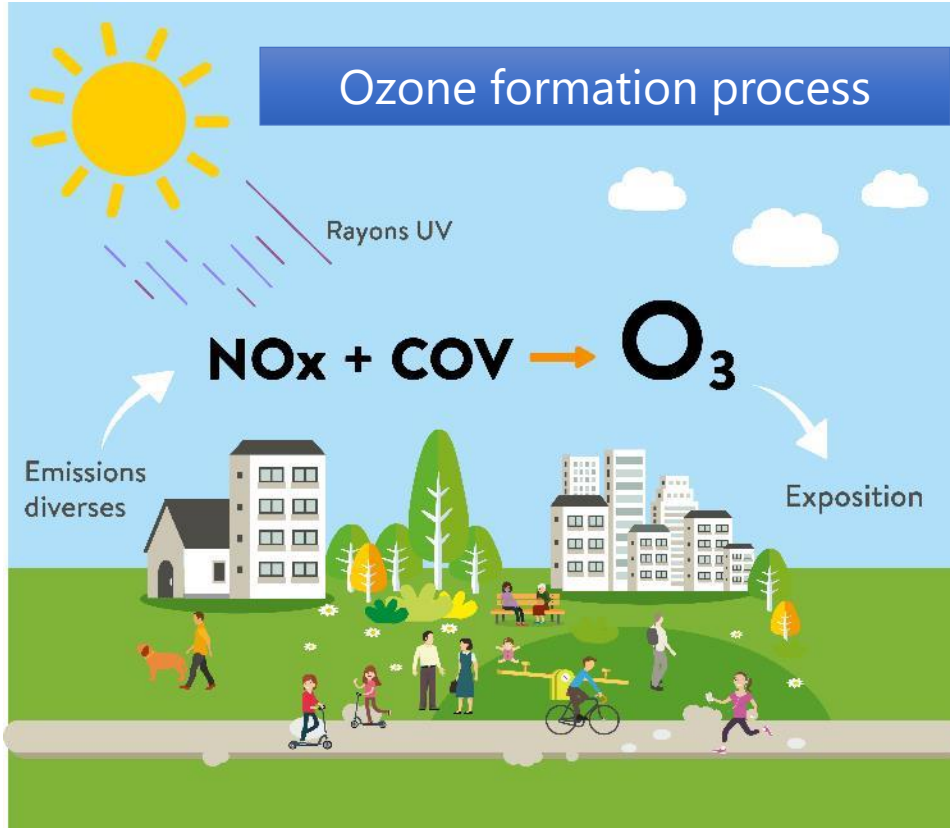
OZONE

Key messages

Pollutant that travels > more of a regional (or even national) problem than a local one.
The only pollutant whose concentrations are rising.
Levels higher in suburban, rural and coastal areas than near major roads.
Average levels in spring (April-May) / peak levels in summer.

Sources

Secondary polluant
Formed from primary pollutants resulting from human activities, and biogenic emissions under the effect of solar radiation.

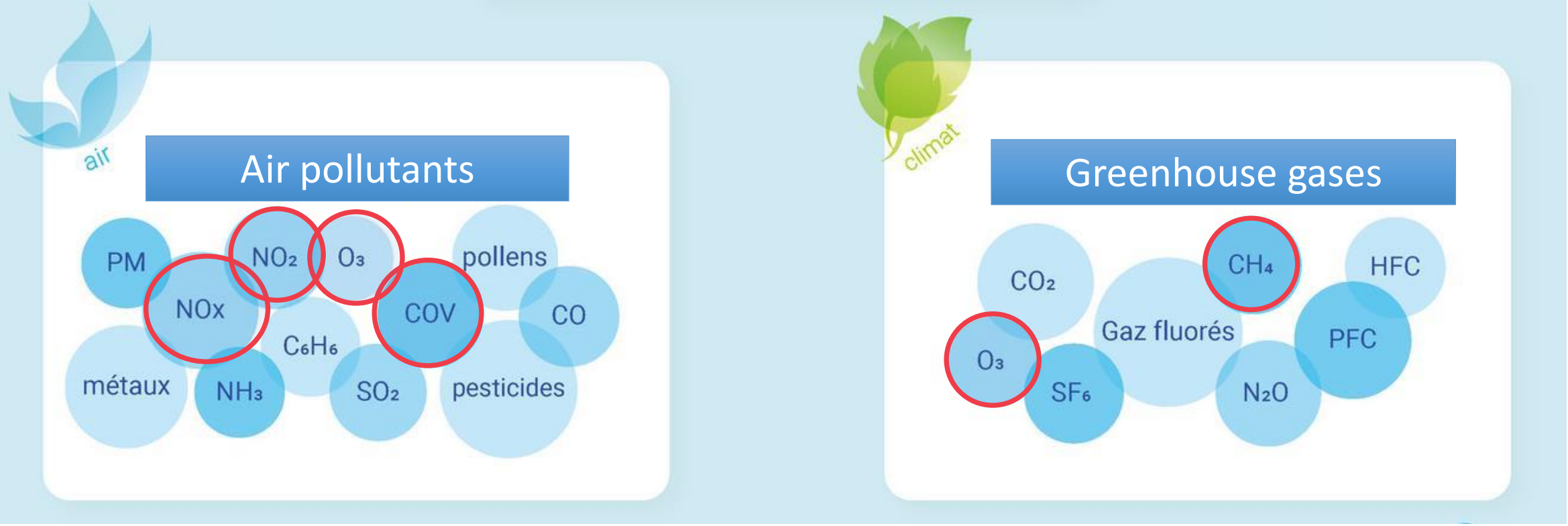


Effects

Coughing, lung damage, eye irritation.
Cardiovascular effects.

Damage to plants (crop yields).Degrades materials (rubber, textiles).Contributes to the greenhouse effect..

THE AIR AND CLIMATE CHALLENGES



DISPERSION phenomenon

- LOCAL Impact
- HEALTH , VEGETATION, CROPS,

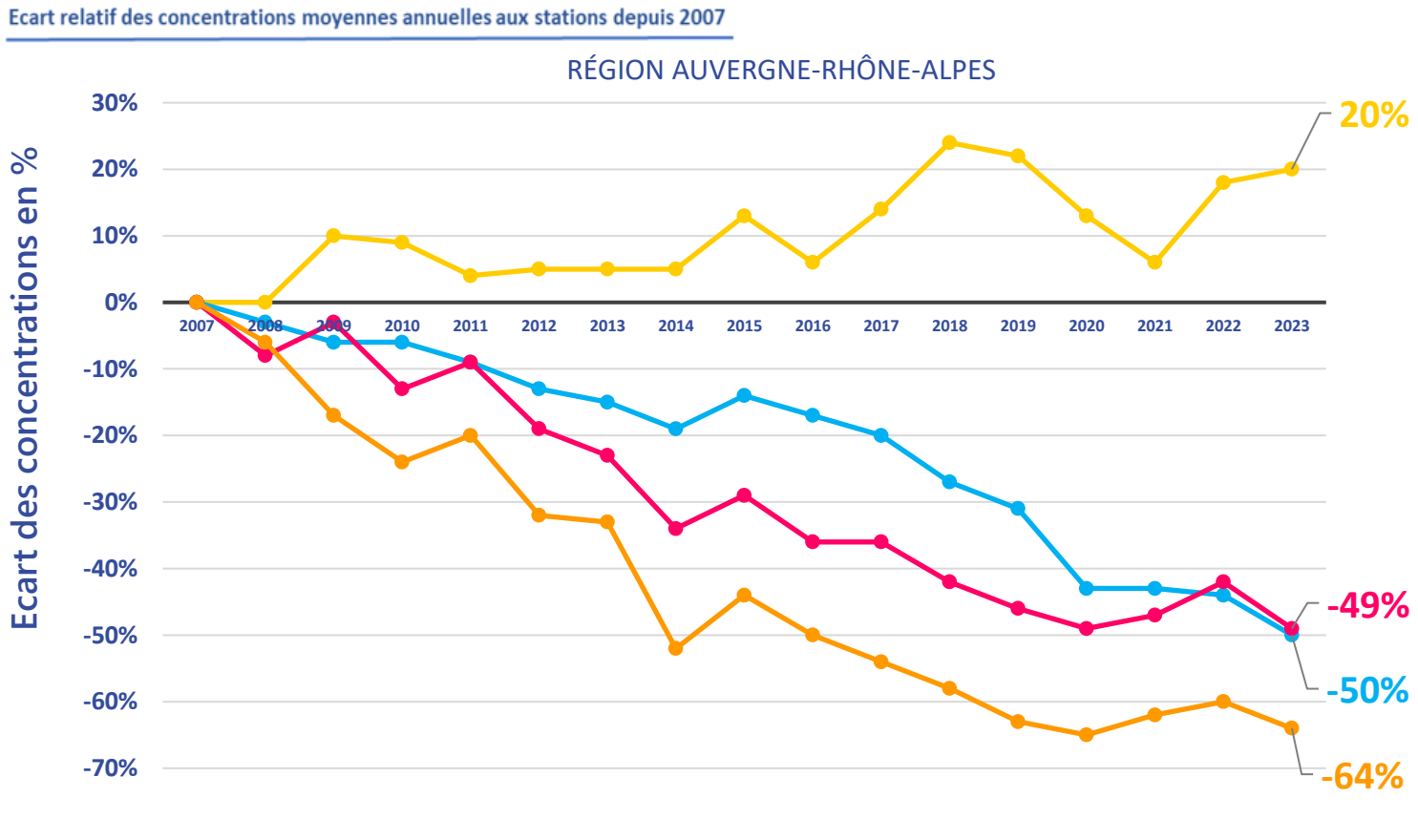
ACCUMULATION phenomenon

- GLOBAL Impact
- CLIMATE

Ozone is the 3rd GHG after CO_2 and methane

LONG-TERM TRENDS IN POLLUTANT CONCENTRATIONS IN THE AUVERGNE-RHÔNE-ALPES REGION

Annual average ozone levels continue to rise



O_3

Strong impact of weather conditions > inter-annual variations.

THE only pollutant that is not decreasing

PM10

NO_2

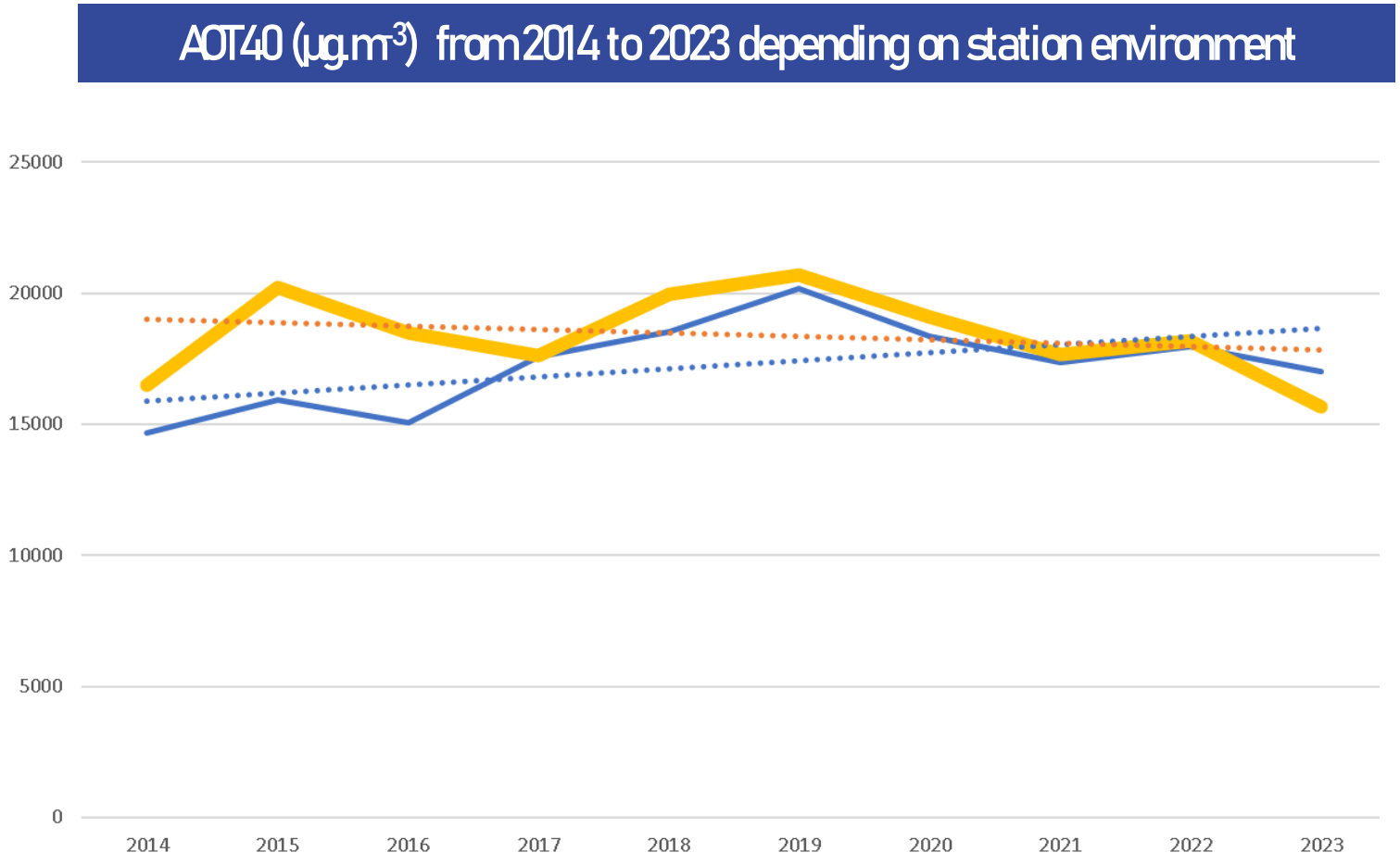
PM2,5

VEGETATION INDICATOR AOT40 :

LIMITED TRENDS IN AUVERGNE-RHÔNE-ALPES

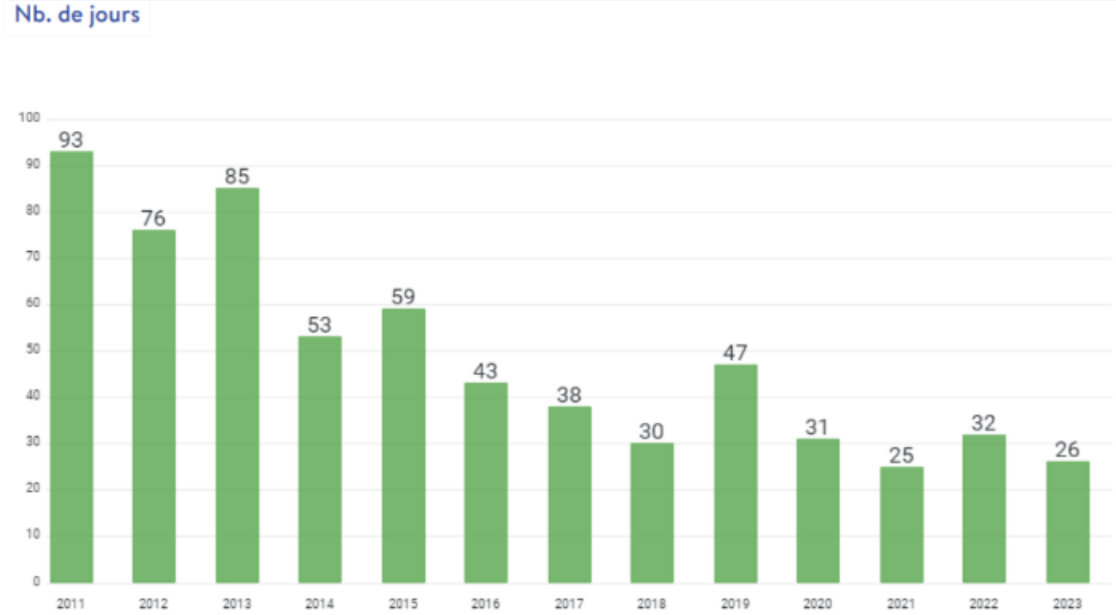
Average Suburban environment

Average in rural environment

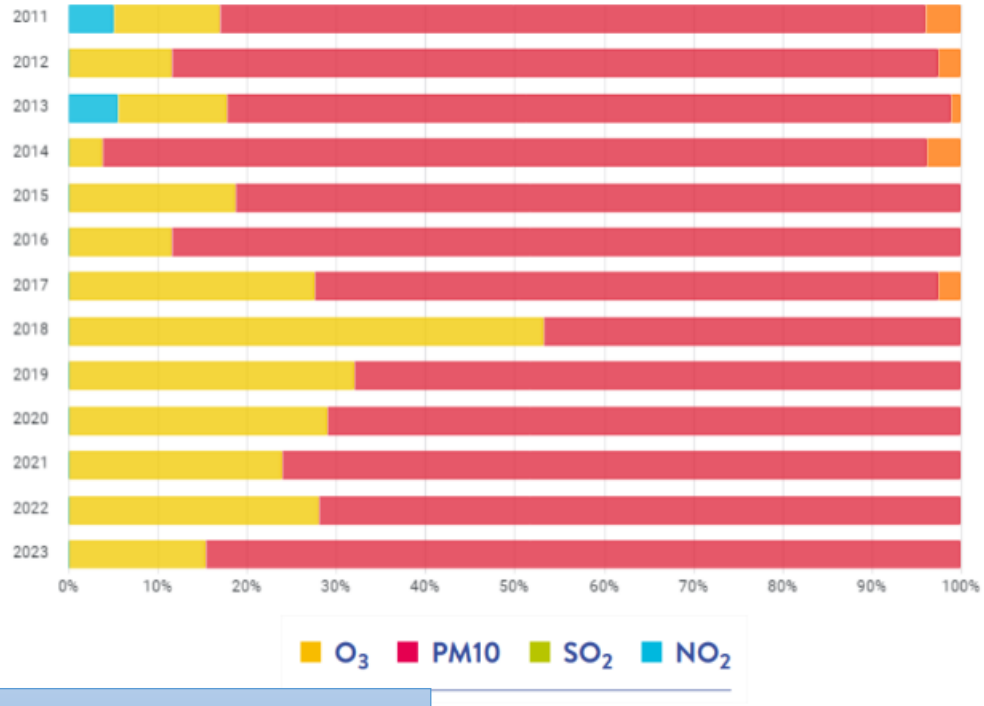


POLLUTION EPISODES IN AUVERGNE-RHÔNE ALPES (OZONE PEAKS)

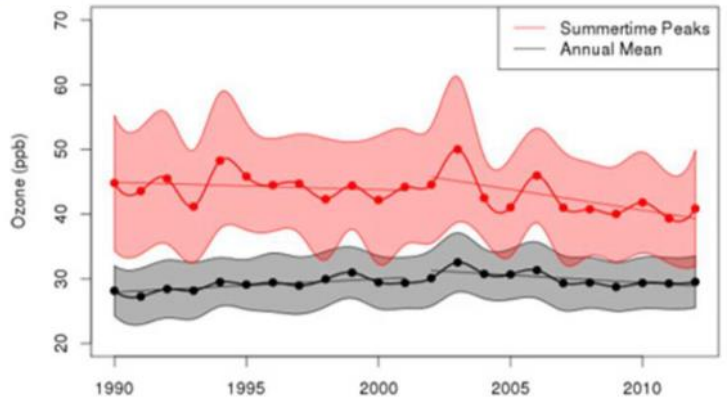
Number of pollution episode days from 2011 to 2023



Pollutants responsible for pollution days from 2011 to 2023

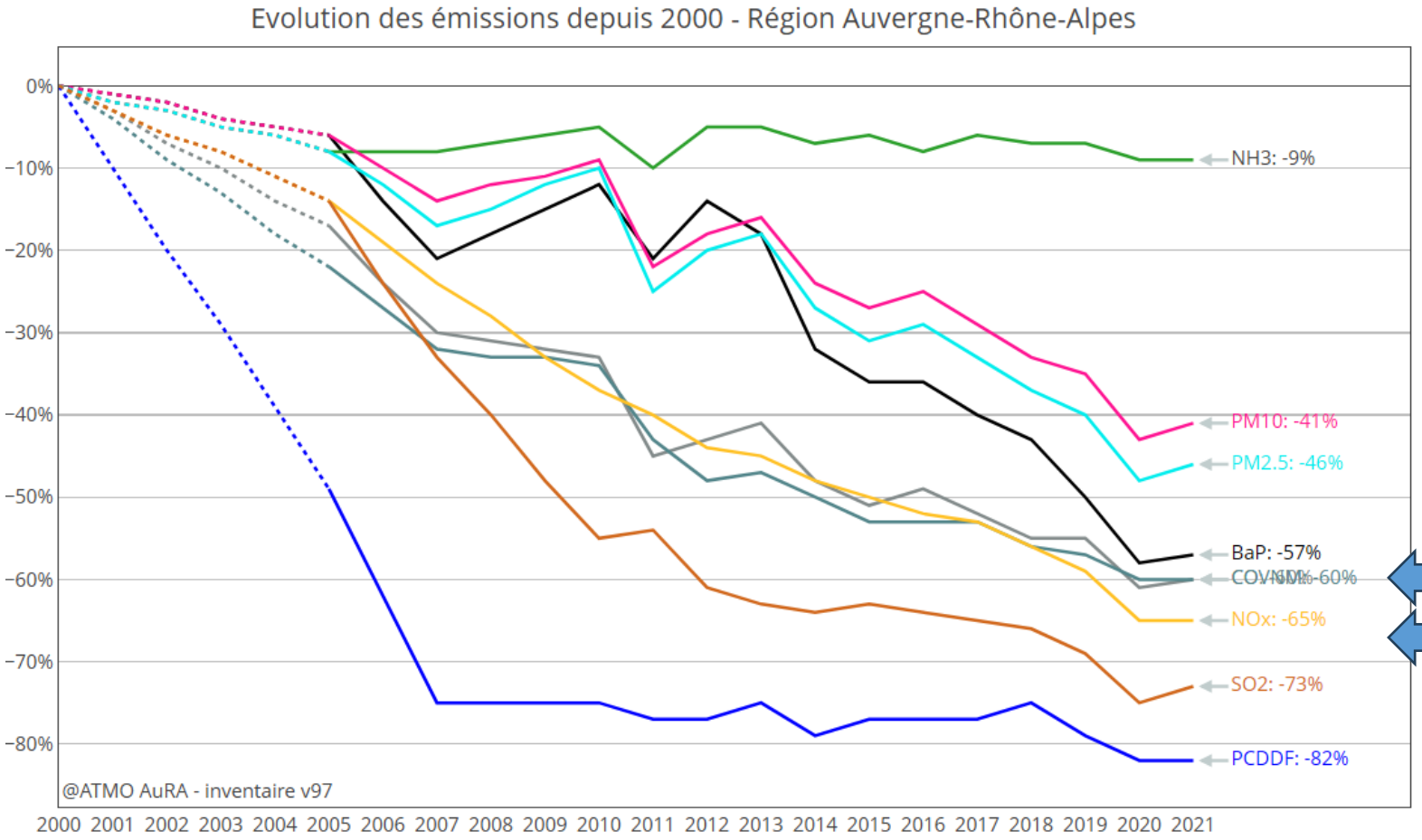


The main pollutants responsible are PM10 particles and ozone
Ozone peaks now tending to disappear in summer



Ozone precursors are falling

POLLUTANT EMISSIONS IN AUVERGNE-RHÔNE-ALPES FROM 2000 TO 2021



Ozone precursors

COVNM =-60%

NOx =-65%

Industry : improved decontamination methods and closure of certain sites
Residential : gradual replacement of individual wood-burning stoves
Transport : fleet renewal (particulate filters, catalytic converters, etc.)

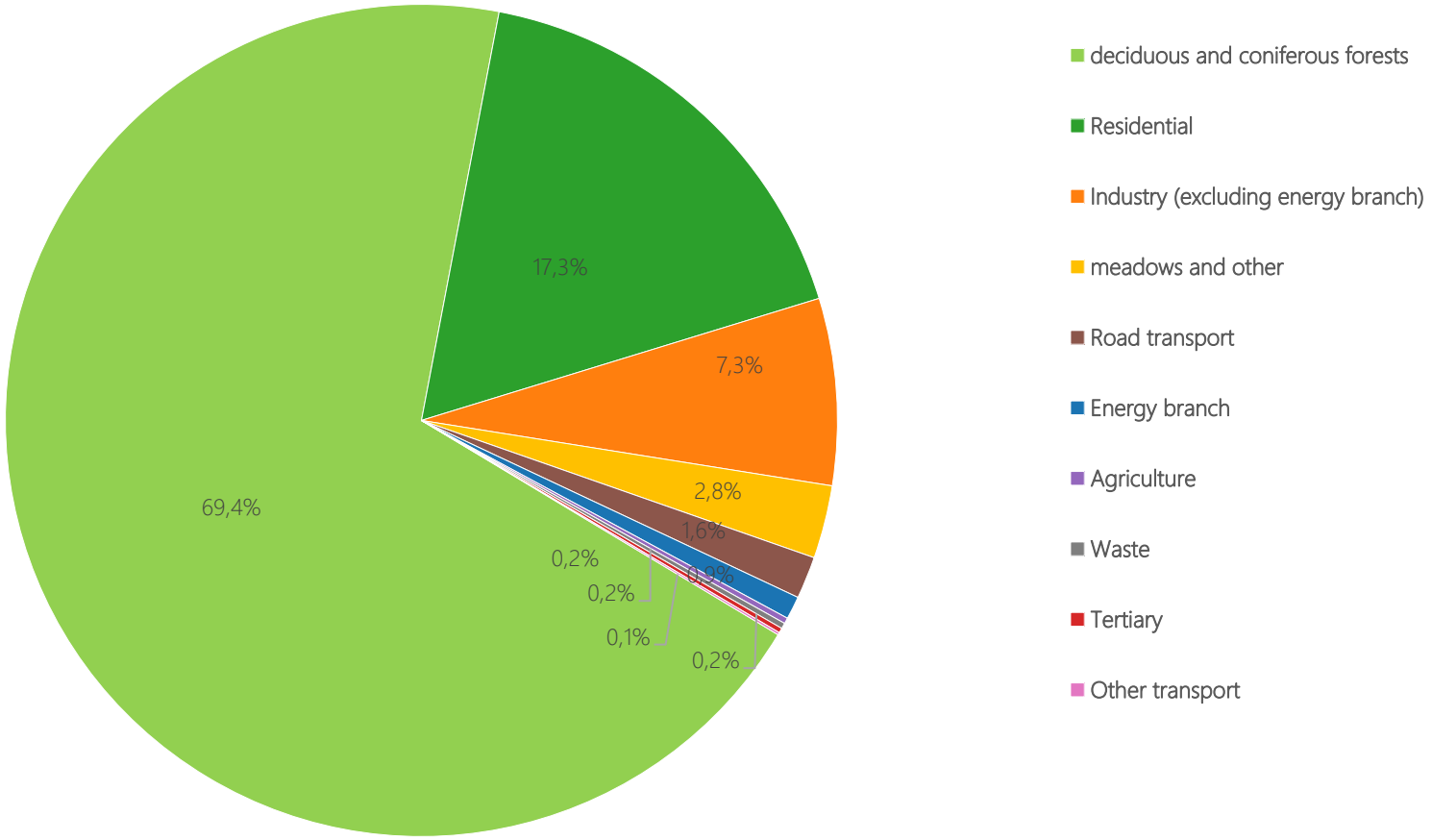
Levers for action : breakdown of emission sources of NOx, COVNM, CH4

Methane

Agriculture : 64%
Industrie : 26%

votre parten'air AUVERGNE-RHÔNE-ALPES

Breakdown of non-methane VOC emissions in the region (natural and anthropogenic), 303kt

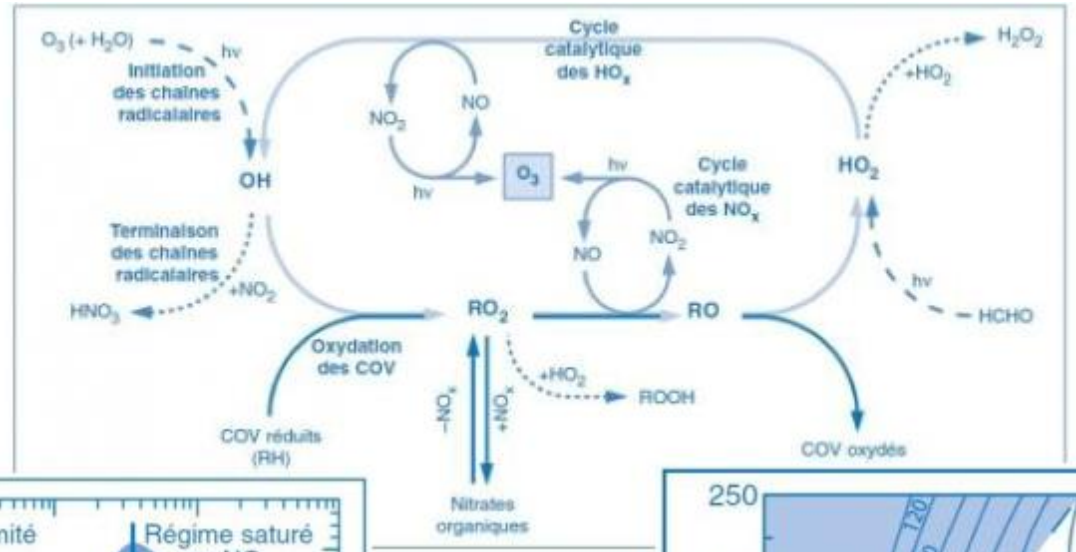


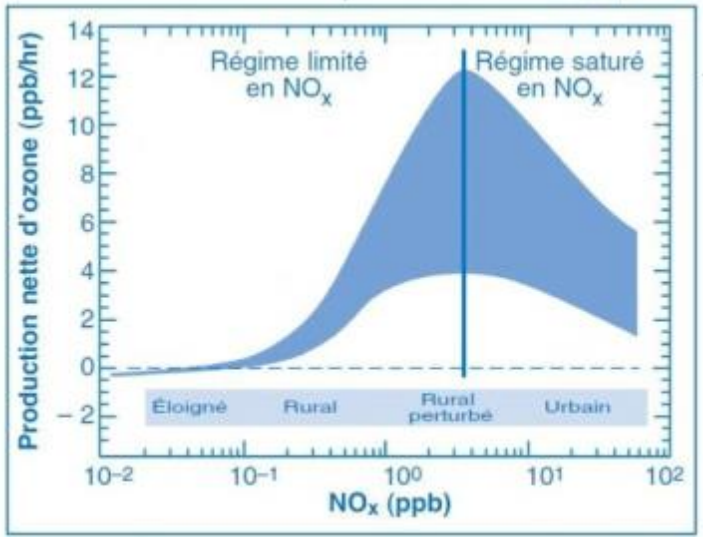
But necessary to consider the importance of natural emissions of NMVOCs as ozone precursors

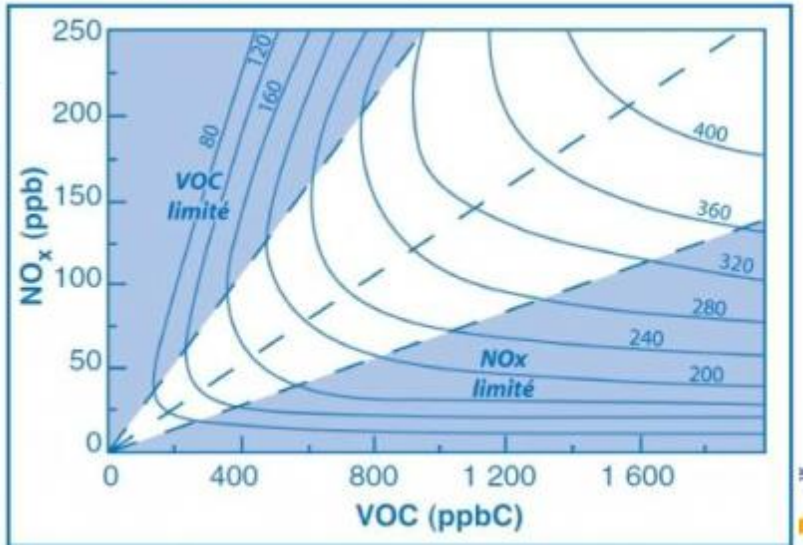
Around 70% of emissions come from natural sources

The complexity of ozone

A highly complex chemical reaction cycle, but need to reduce NOx and NMVOCs to reduce ozone



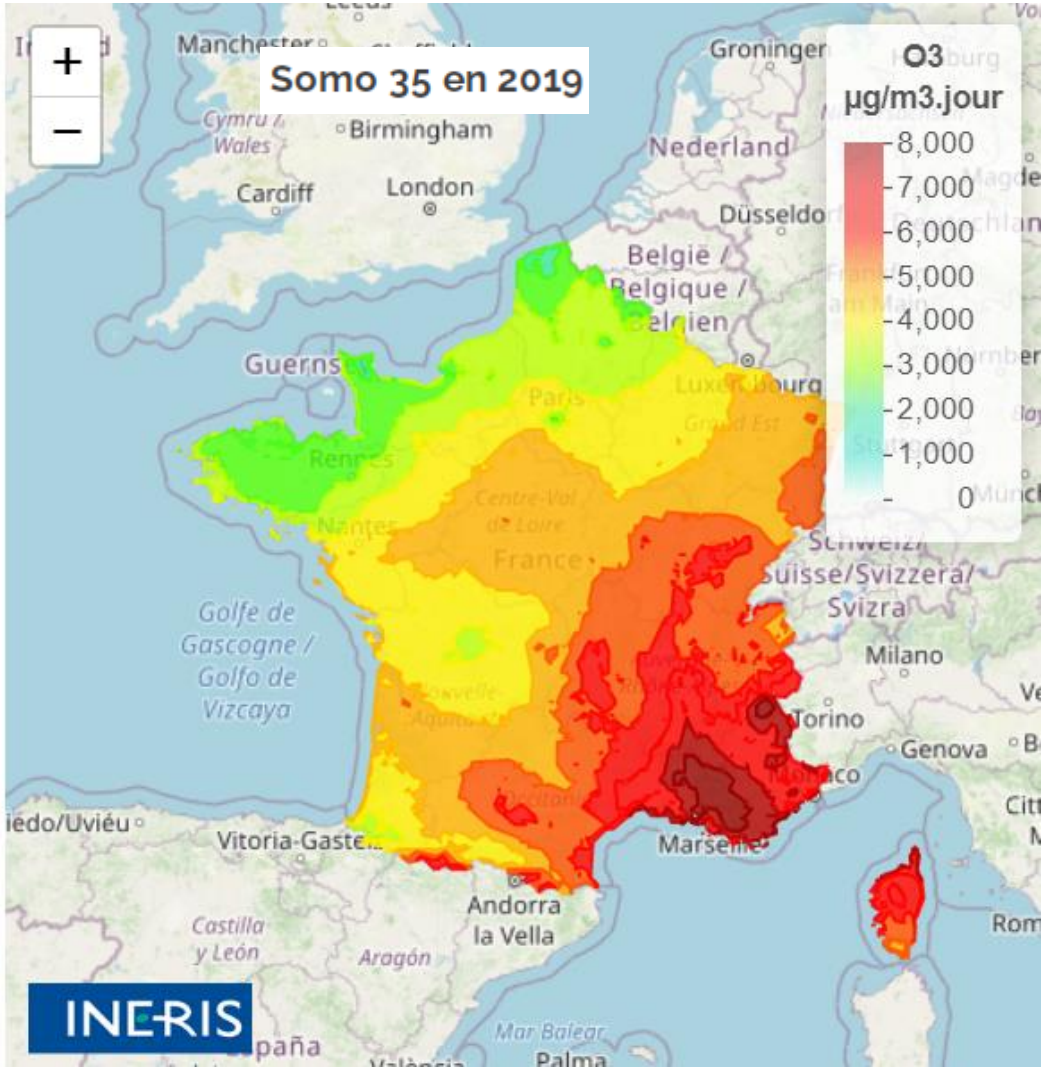




In the coming years, ozone chemistry in urban and suburban environments could become more sensitive to NMCOVs, in connection with the reduction in NOx from transport.

What is the situation regarding O_3 issues in the AuRA region ?

A large-scale problem



"With **global warming**, an annual increase in ozone concentrations of the order of 2 to 3 µg/m³ on average over the summer is likely, and summer pollution peaks could be more frequent."
INERIS

The population exposure indicator (SOMO35) is rising (by 7% between 2000 and 2019).

OZONE
Target value for health

O_3
Valeur cible santé

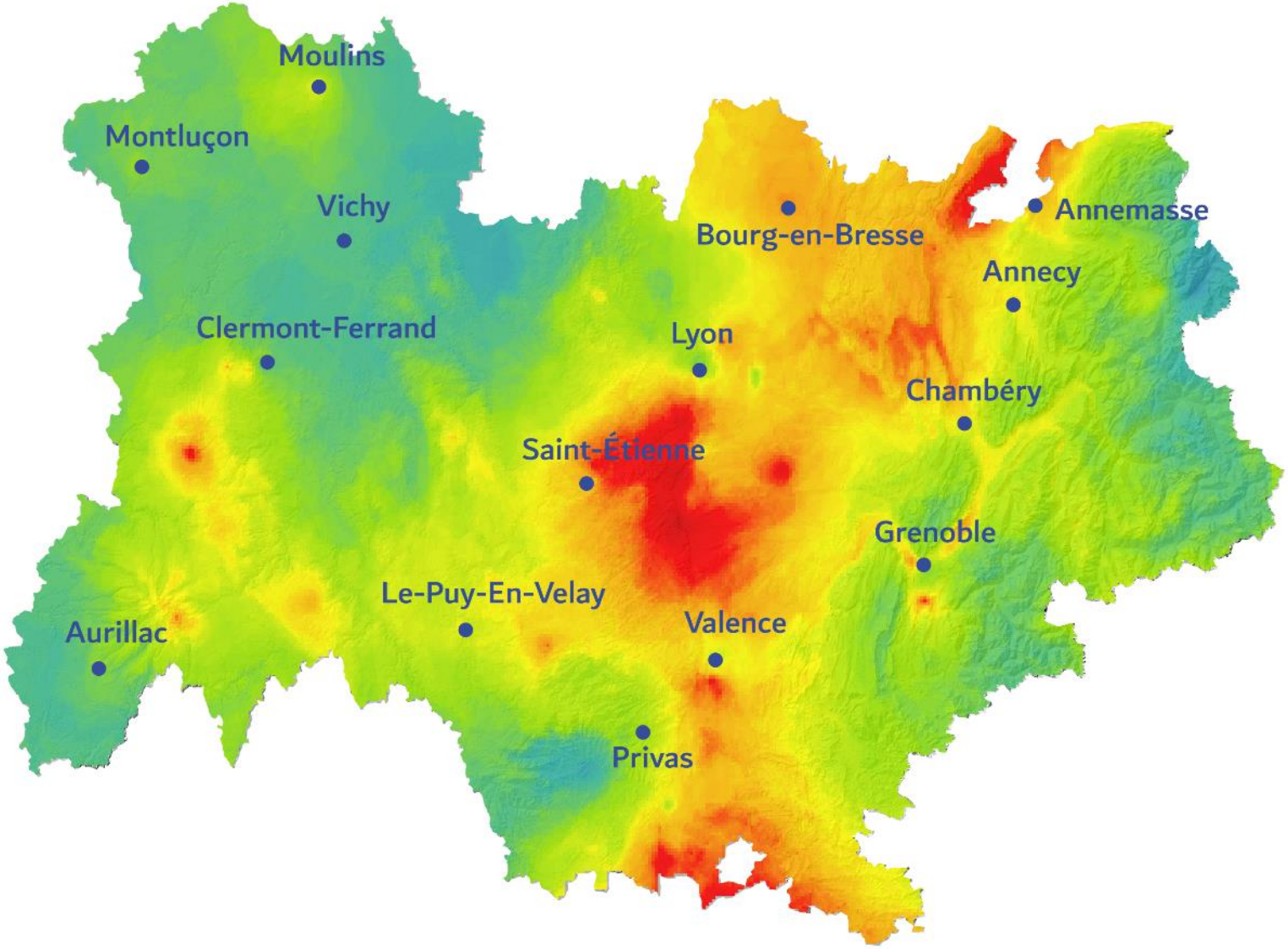
RÉGION 278 500 habitants (3% pop)

Nombre de jours avec une moyenne sur 8h > 120 µg.m^{-3}
(moyenne sur 3 ans)

0 5 10 15 20 **25** 50

Valeur cible pour la protection de la santé humaine

O_3 Santé



OZONE

Target value for vegetation

AOT40* en µg.m^{-3}.h
(exposition cumulée en journée de mai à juillet, moyenne sur 5 ans)

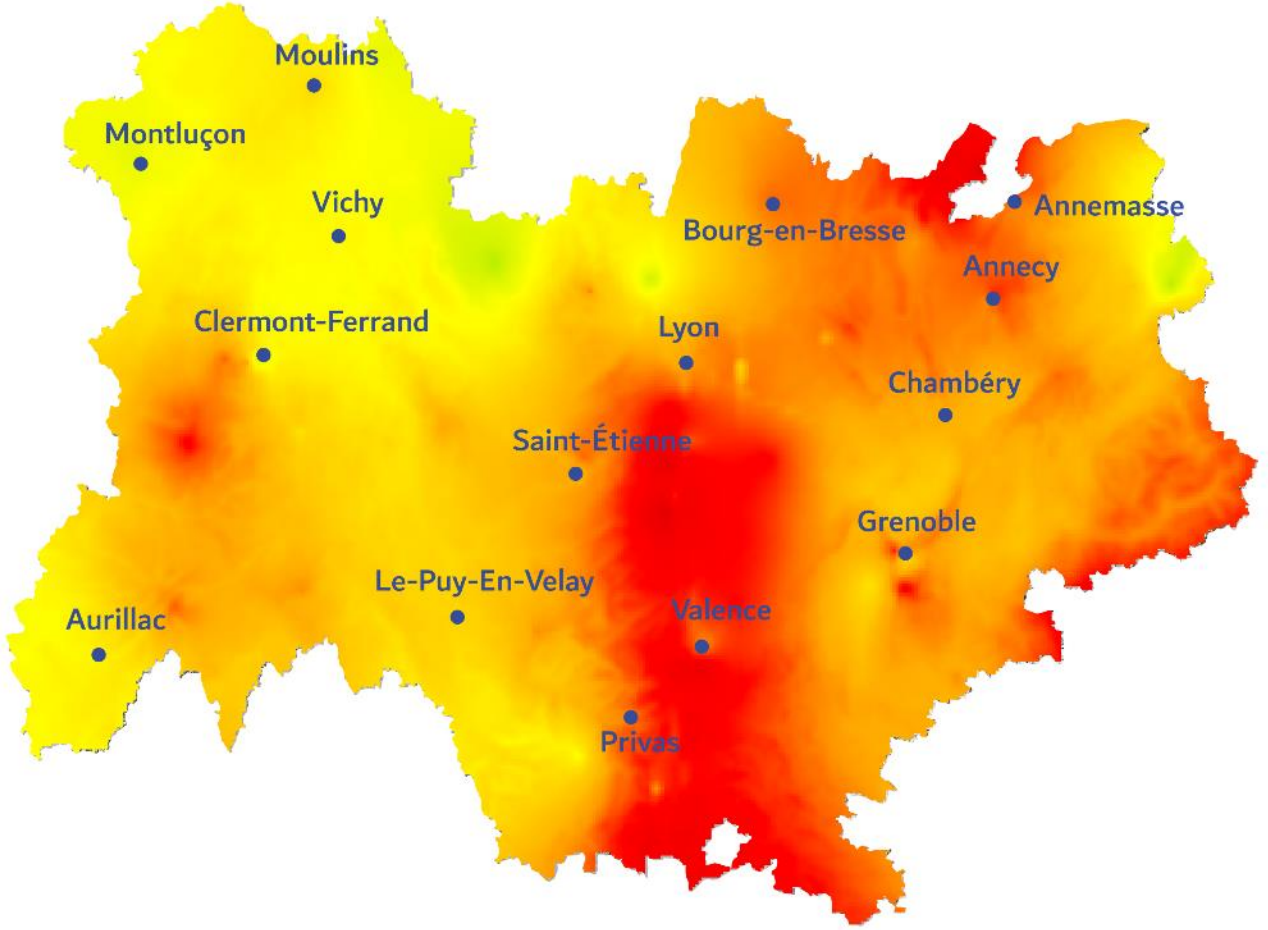
0 | 5400 | 7200 | 9000 | 10800 | 16200 | **18000** | 36000

Valeur cible pour la protection de la végétation

*Accumulated Ozone over Threshold

O_3 Végétation

Significant annual variations : In 2023, a limit of 5% of the regional ecosystem surface area exposed to excessively high ozone concentrations for vegetation, compared with 16% in 2022 (a 3-fold reduction).



70 903 km²	Surface régionale
67 945 km²	Surface de la zone écosystème dans la région
3 443 km²	Surface de la zone écosystème en dépassement
96 %	Part de la zone écosystème régionale
5 %	Part de la zone écosystème en dépassement

Une zone qualifiée d'écosystème correspond à la partie du territoire hors zone urbaine. Cela permet de caractériser les zones avec de la végétation (espaces naturels, cultures, etc.) pouvant être affectées par de la pollution à l'ozone.

The proportion of agricultural land exposed to ozone levels above the threshold in **Europe** countries is considerable from 5% (2020) to 18% (2021) [European Environment Agency]

3 OZONE CONSEQUENCES

What is the situation regarding O_3 issues in the AuRA region ?

Ozone impacts

Ozone has **impacts on plant productivity**, leading to economic losses and decreases in the quality of agricultural products

The associated costs have been quantified, for 2010:
1 billion € for soft wheat,
>1 billion € for grasslands,
>200 million € for potato crops.

APollO **(Economic analysis of the impacts of ozone air pollution on agricultural and forestry productivity in France) ADEME INERIS**

French institute INERIS has shown that ozone levels reduce the capacity of trees to store CO2 by 14%.

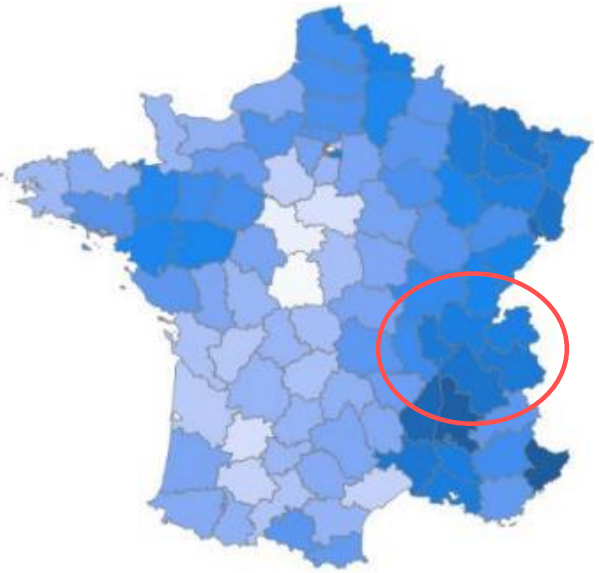
16,800 **premature deaths**
in Europe in 2019 attributable to ozone
i.e. +25% in 10 years
European Environment Agency

An **increase in average concentrations**
of +22% between 2007 and 2019.
Since 2011, about ten days of ozone vigilance each year.
Atmo Auvergne-Rhône-Alpes

"With **global warming**, an annual increase in ozone concentrations on the order of 2 to 3 µg/m^3 on average over the summer is likely, and summer pollution peaks could be more frequent."
(INERIS)

votre parten'air Atmo AUVERGNE-RHÔNE-ALPES

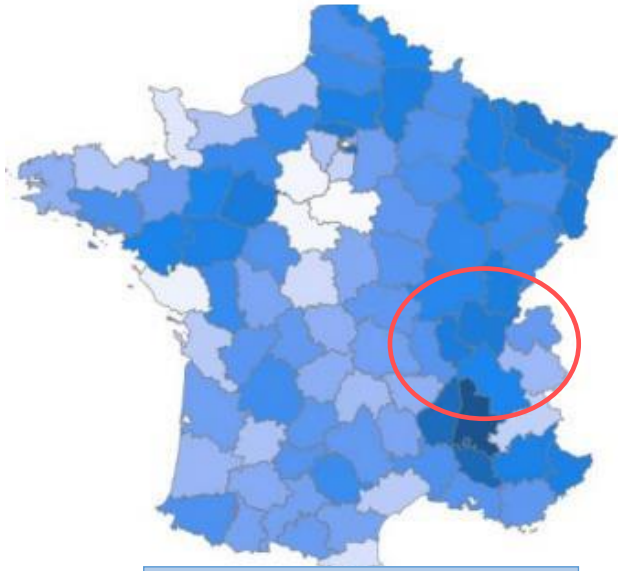
IN FRANCE AND AUVERGNE-RHÔNE-ALPES REGION : CLEAR LOSSES IN THE AGRICULTURAL SECTOR



Loss of productivity

8% 12% 16% 20%

Soft wheat



Loss of productivity

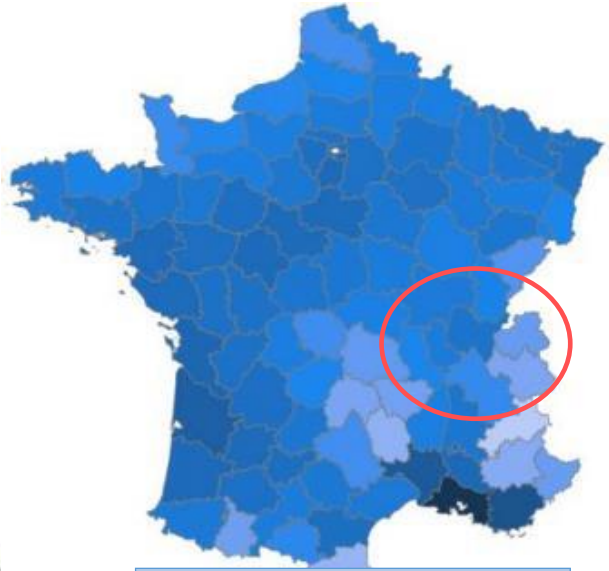
5% 10% 15% 20%

Potatoes

Loss of productivity

0% 3% 6% 9% 12%

Tomatoes



Loss of productivity

0% 5% 10% 15% 20%

Grass lands

Source : Données 2020, Etude APOLLO de l'INERIS

OZONE EFFECTS ON TREES

Different species are affected to different degrees of sensitivity :

- Ozone modifies the competitive relationships between species : disappearance/development, etc.

- Ozone alters the composition of ecosystems and their biodiversity.

Espèces sensibles	Espèces modérément sensibles	Espèces peu sensibles
Pin noir	Bouleau	Douglas
Pin sylvestre	Platane	Erable
Pin maritime	Hêtre	Chêne
Pin cembro	Mélèze	

Sensibilité à l'ozone des principales espèces d'arbres ICP Végétation, 2011 (Ulrich et al.2006)

EXAMPLE ON TREE SPECIES

The most vulnerable species

Scotch pine

Less sensitive species

Green oak

Plane tree

SUMMARY OF MODELLING IN FRANCE OF YIELD LOSSES AND ECONOMIC LOSSES FOR OZONE-SENSITIVE SPECIES

Agriculture

	Perte de rendement moyen 2020	Perte économique en millions d'€ en 2020
Soft wheat	14%	843
Potatoes	11%	196
Tomatoes	1%	5
Grass lands	10%	954

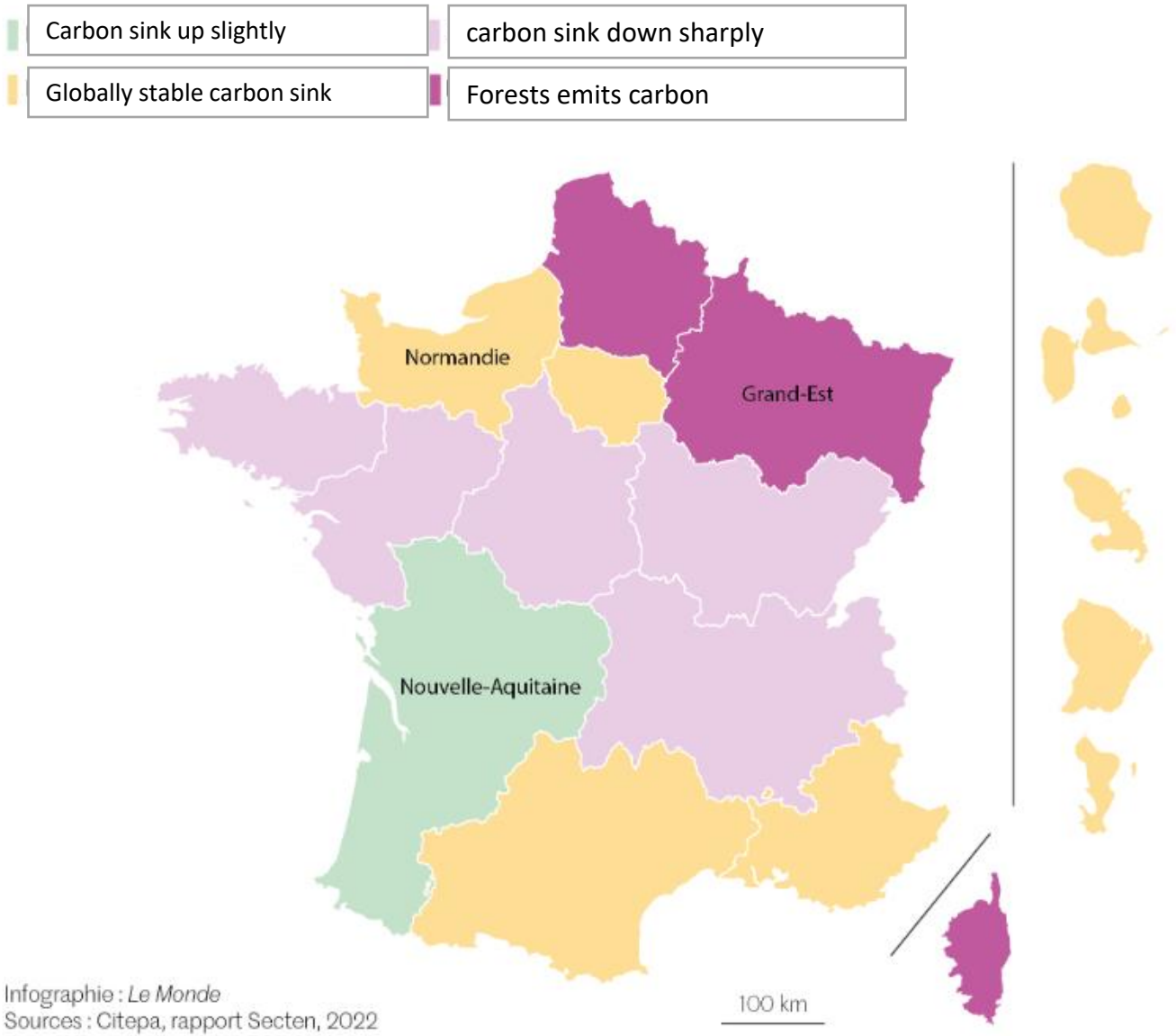
Forest

Oak	12%	177
Beech	20%	60
Epicea	5%	20

Source : Etude APOLLO de l'INERIS 2020

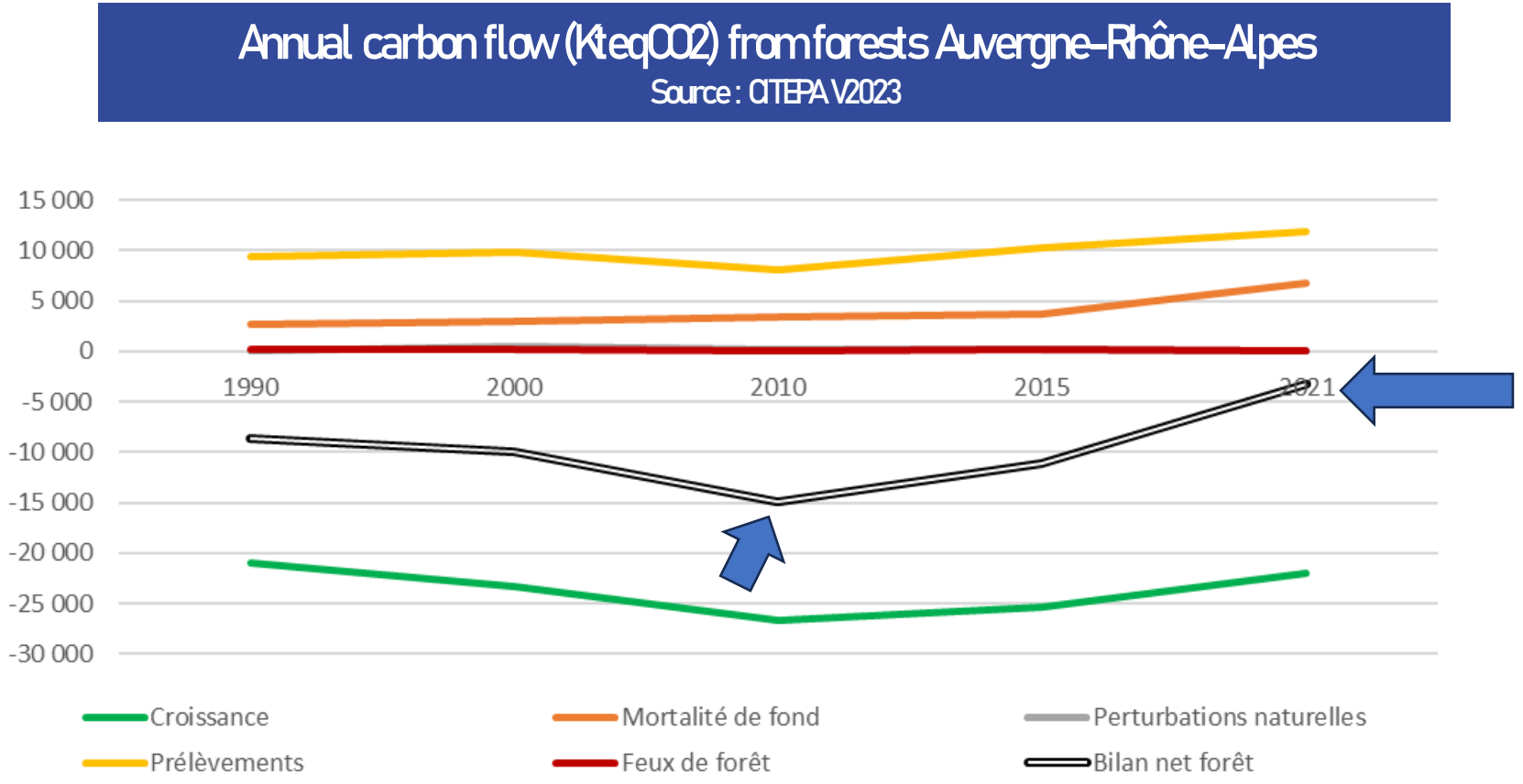
Projection for 2030 of the same order of magnitude…

CARBON ABSORPTION CAPACITY OF FORESTS IN THE REGION



- As long as a tree lives and grows, it absorbs more CO_2 than it emits,
- Over its entire life cycle, a tree absorbs as much CO_2 as it releases,
- Droughts, diseases, insect infestations and fires have led to increased tree mortality and a more rapid release of the carbon stored in tree biomass.

ANNUAL CARBON FLOW

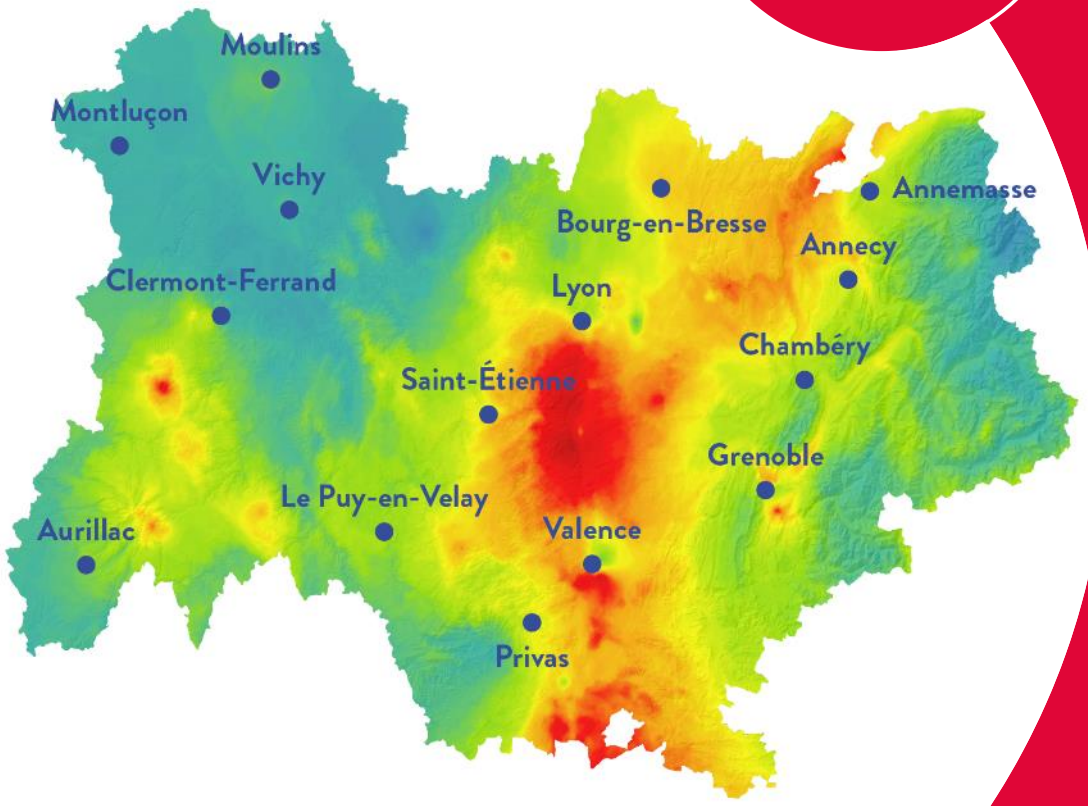


The carbon absorption capacity of growing forests has been declining since 2010.
Ozone is one of the explanatory factors.

4

ACTION LEVERS

REGIONAL SCALE, NATIONAL SCALE



Levers for action

Different levels of action (government-supported plan)

- Regional scale : Ozone considered to be one of the priority issues in the Water, Air and Soil strategy for the Auvergne-Rhône-Alpes region >> **Plan regional ozone Auvergne-Rhône-Alpes**

- National scale : The regional work has triggered a national awareness >>> **national working group** : sharing knowledge, multiplying the effectiveness of actions.

- But also necessary to consider a broader level of action : European, global

Levers for action

The complexity of ozone

Against a backdrop of climate change : continue to take actions on all sources of precursors - anthropogenic AND natural - to create a virtuous circle.

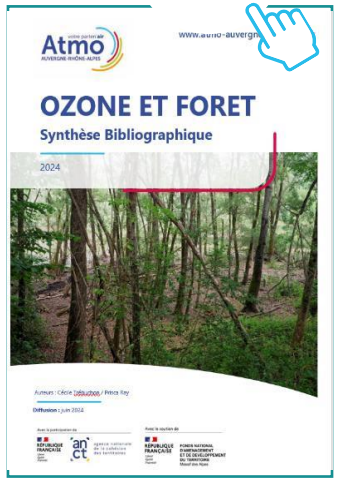
Different types of actions

- Auvergne-Rhône-Alpes regional ozone plan, 22 actions targeting all sources of precursors.

- Projects and studies to improve knowledge

    - Improve knowledge of the proportion of natural NMCOV in forests (ALP'AERA project)
    - Adapting vegetation and forests
    - Targeted action on NMCOV precursors : prioritise reduction efforts on molecules with the greatest ozone-forming potential

Consulter



What is the situation regarding O_3 issues in the AuRA region ?

Regional Ozone plan (2021) : list of actions

PRÉFÈTE DE LA RÉGION AUVERGNE-RHÔNE-ALPES
Liberté
Égalité
Fraternité

4 flaps:

- improving knowledge
- communication and awareness
- operational actions
- pollution peaks

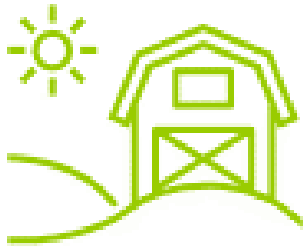
These actions focus on the **control of ozone precursor emissions**: nitrogen oxides (mainly emitted by road transport) and volatile organic compounds (methane emitted mainly by agricultural activities, and other organic compounds emitted by vegetation, industrial activities, and residential).

22 actions across all sectors

Thématique	N°	Actions
Transversal	Transversal	Rechercher les financements et partenariats de mise en œuvre du Plan ozone
Agriculture	A.1	Mobiliser les outils et dispositifs favorisant une alimentation animale permettant de réduire les émissions de précurseurs à l'ozone
	A.2	Intégrer les enjeux de la pollution à l'ozone dans la fiche alimentation animale label bas carbone
	A.3	Réaliser une étude complémentaire au guide ADEME sur les bonnes pratiques agricoles en faveur de la qualité de l'air
	A.4	Sensibiliser à l'impact des effluents d'élevage sur les émissions de précurseurs d'ozone
Forêt	F.1	Intégrer les enjeux de la pollution à l'ozone dans la fiche reboisement label bas carbone
	F.2	Présenter au sein de la Commission régionale de la forêt et du bois les enjeux de la pollution à l'ozone du secteur forestier
	F.3	Réalisation d'un guide sur les arbres qui absorbent de l'ozone/arbres plus faiblement émetteurs de COV
	F.4	Identifier les leviers opérationnels pour la prise en compte de l'ozone dans les renouvellements/développements forestiers
Transports	T.1	Réduire les vitesses de circulation
	T.2	Sensibiliser les employeurs au recours au forfait mobilité durable et au télétravail dans le cadre des négociations d'entreprises, développer une charte d'employeurs volontaires et encourager la mise en place de tiers-lieux
	T.3	Généraliser les vignettes Crit'Air à l'ensemble du parc roulant de la région
	T.4	Promouvoir et généraliser le principe d'une tarification incitative en cas de pic de pollution pour rendre les transports collectifs plus attractifs et inciter les citoyens à ne pas utiliser leurs véhicules particuliers.
	T.5	Encourager les EPCI à mettre en place une démarche d'engagement volontaire en faveur d'une logistique urbaine durable
	T.6	Lutter contre la fraude à l'ad-blue
Activités industrielles et artisanales	AIA.1	Améliorer les connaissances sur les COVNM et leurs impacts sur la production d'ozone pour mieux cibler les actions vers les COV qui ont l'impact le plus fort : étude à lancer dans le cadre du PREPA, étude régionale appuyée par le national
	AIA.2	Réduire les émissions de COVNM dans les entreprises soumises à la directive 2010/75/UE relative aux émissions industrielles (IED)
	AIA.3	Promouvoir l'adoption des MTD sur la réduction des COVNM dans les entreprises non soumises à la directive 2010/75/UE relative aux émissions industrielles (IED)
	AIA.4	Accompagner le déploiement d'enrobés tièdes, notamment via la commande publique
	AIA.5	Anticiper la communication lors de conditions favorables à la production d'ozone
Résidentiel et bâtiments	RB.1	Encourager l'utilisation de matériaux moins émissifs dans la commande publique et accompagner la montée en compétences des professionnels
	RB.2	Développer une plaquette communicante sur les émissions de COV de la combustion de la biomasse
	RB.3	Déployer une communication à destination du grand public sur l'impact des travaux domestiques

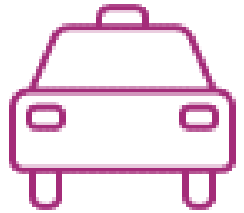
What is the situation regarding O_3 issues in the AuRA region ?

Regional Ozone plan : list of actions



A.1	Promote animal feed that reduces ozone precursor emissions
A.2	Low-carbon label animal feed sheet
A.3	Carry out a complementary study on good agricultural practices to improve air quality.
A.4	Raising awareness of the impact of livestock effluents

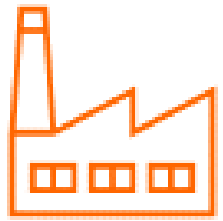
F.1	Review of low-carbon label forestry methods
F.2	Present the challenges of ozone to the regional forestry and timber commission.
F.3	Study of the links between ozone and forests
F.4	Identify operational levers for taking ozone into account in forest renewal/development projects



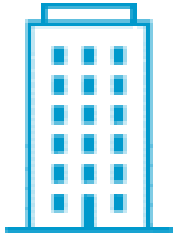
T.1	Reduce traffic speeds
T.2	Sustainable mobility/teleworking package
T.3	Extend Crit'Air badges
T.4	incentive pricing for public transport during peak pollution periods
T.5	Sustainable urban logistics
T.6	Fighting ad-blue fraud

What is the situation regarding O_3 issues in the AuRA region ?

Regional Ozone plan : list of actions



AIA.1	knowledge of industrial VOCs
AIA.2	Reducing emissions of NMVOCs in companies subject to industrial emissions Directive (IED)
AIA.3	Promoting the adoption of BAT for reducing NMVOCs in companies not subject to IED
AIA.4	Deployment of warm-mix asphalt
AIA.5	Communication during conditions favorable to ozone production



RB.1	Less emissive materials in public procurement
RB.2	Communication brochure on VOC emissions from biomass combustion
RB.3	Communication about the impact of household chores

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EMERGING SOLUTIONS

- Some species are more resistant to ozone than others
- Some species produce few NMVOCs (ozone precursors)
- Some species even absorb ozone

CONCLUSION

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Climate change could increase regional ozone concentrations,

Lead to an increase in the already visible health and environmental impacts,

actions to reduce ozone must be carried out by acting on precursors and all sources, preferably in a targeted manner.

Atmospheric pollution and the fight against climate change must be dealt withtogether,

Studies and experimentations need to be continued

Develop inter-regional and inter-country cooperation to implement actions on a larger scale to be efficient

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感谢您的关注

Thanks for your attention !

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