Italian activities under the Working Group on Effects and CLRTAP (2019-2020)

Alessandra De Marco et al.

Working Group on Effects 17/09/2020

Agenzia nazionale per le nuove tecnologie, l'energia
e lo sviluppo economico sostenibile

NEC ITALY NETWORK: PARTNERSHIP and RESEARCH THEMES

MATTM — MINISTRY OF ENVIRONMENT

ENEA

CUFAA — FOREST CARABINIERI CORPS

CNR

IRET

Contact: E.Paoletti
Research: ozone

MOTTLES

IRSA

Contact: A.Marchetto; M.Rogora
Research: atmospheric depositions; freshwater chemistry

IRET - IBE

Contact: B.De Cinti; G.Matteucci;
Research: foliar nutrients

CREA

FL

Contact: A.Cutini
Research: tree growth

Contact: S.Fares
Research: meteorology

UNIFI

DISPAA

Contact: S.Carnicelli
Research: soil solution

DAGRI

Contact: F. Bussotti
Research: crown conditions

UNICAM

Biosciences and Veterinary medicine School

Contact: R.Canullo
Research: ground vegetation diversity

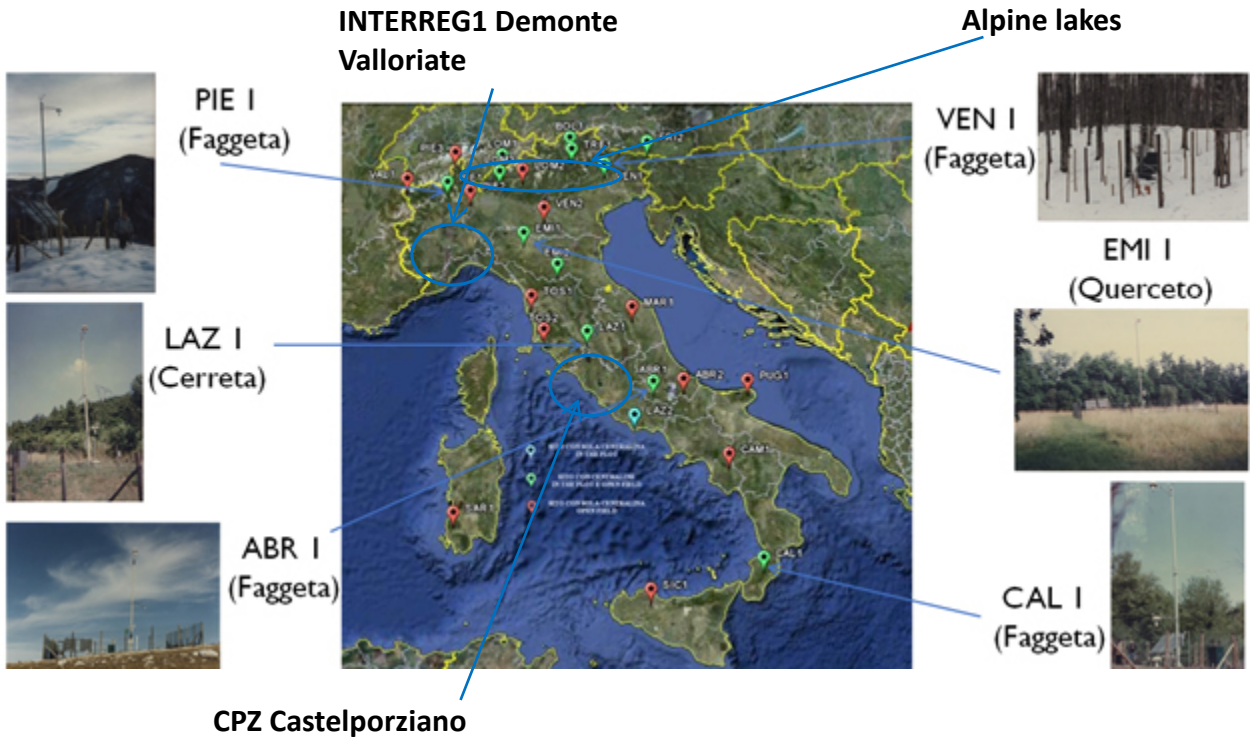
UNICAM Ext. Ass.: Terradata environmetrics Srl
Contact: G. Brunialti; L.Frati
Research: lichens monitoring

NEC ITALY NETWORK: START

Dec 2018 Agreement between MATTM and CUFAA

Mar 2019 Approval of the Operational Plan and start of field campaigns

TERRESTRIAL ECOSYSTEM STUDY AREAS



6 forest sites and 4 freshwater sites belong to the CLRTAP programs (**ICP Forests and ICP Waters**).

Monitoring methods applied are those explained in the relative manuals and mentioned in the NEC Directive.

CARABINIERI

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE

NEC ITALY NETWORK: first year REPORTING

Mar 2019 – Mar 2020

The NEC Italy Network first year reporting partially overlapped with the Covid19 emergency…

ALL FORESEEN FIELD CAMPAIGNS WERE ACTIVATED AND COMPLETED

Sample collection was completed but, in some cases, samples were stabilized first and analysed in a second step, due to labs closure during lockdown

THE FIRST YEAR REPORTING TO THE NATIONAL AUTHORITY WAS DELAYED UNTIL MAY 2020

CARABINIERI

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

MOTTLES

Ozone: The new monitoring network

The new Monitoring at forest sites

MOTTLES presents m

rather than passive
s

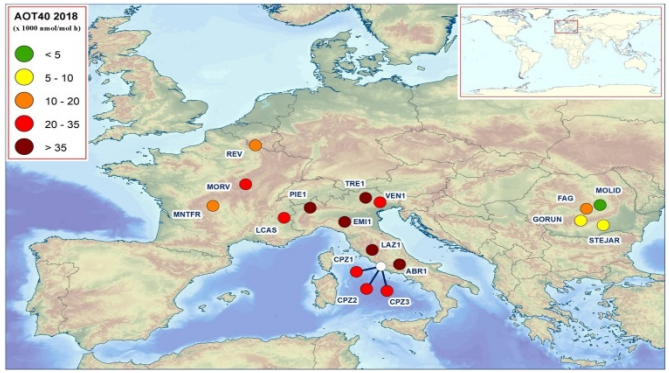
n 17 sites selected from
P forests-CONECOFOR,

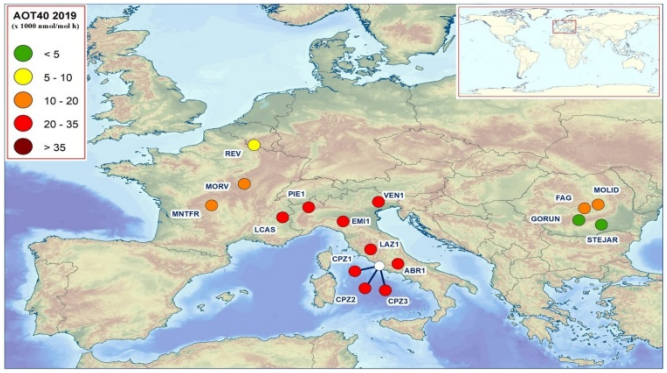
Area	Code	Country	Targ
Passo Lavazè	TRE1	Italy	*Pice*
Pian Cansiglio	VEN1	Italy	*Fag*
Val Sessera	PIE1	Italy	*Fag*
Carrega forest	EMI1	Italy	*Que*
Acquapendente	LAZ1	Italy	*Que*
Castelporziano	CPZ1	Italy	*Que*
Castelporziano	CPZ2	Italy	*Phil*
Castelporziano	LAZ3	Italy	*Pinu*
Selva Piana	ABR1	Italy	*Fag*
Fundata	FAG	Romania	*Fag*
Mihăești	GRUN	Romania	*Q.*
Ștefănești	STEJAR	Romania	*Q. r*
Predeal	MOLID	Romania	*Pice*
Revin	REV	France	*P. a*
Morvan	MORV	France	*Alnu*
Montfranc	MNTFR	France	*Pinu*
Le Casset	LCAS	France	*Lari*

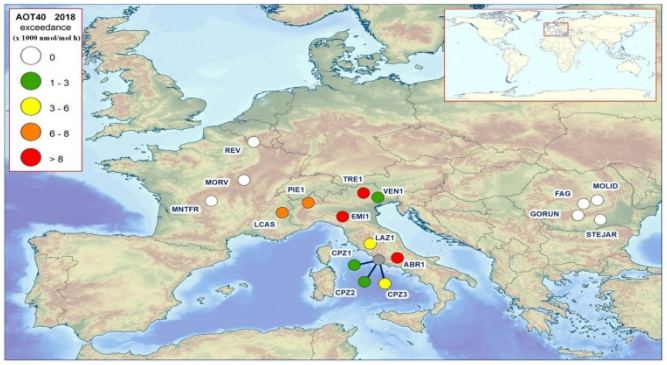
ACTIVE MONITOR
(high resolution)

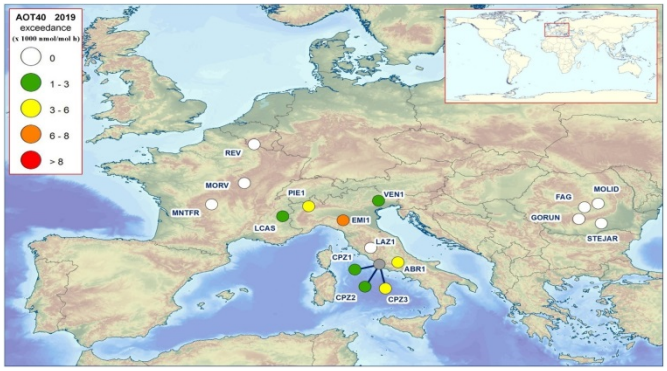
Critical levels in fie

AOT40 levels and Exceedances



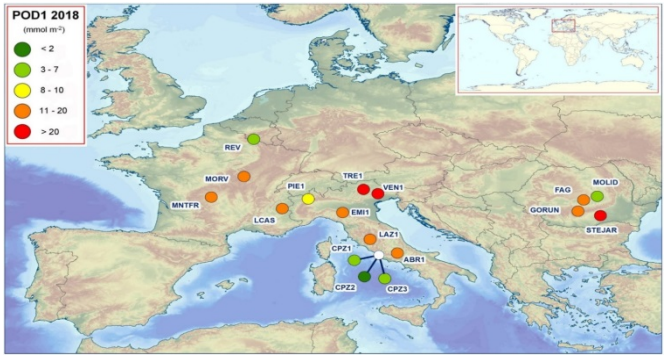


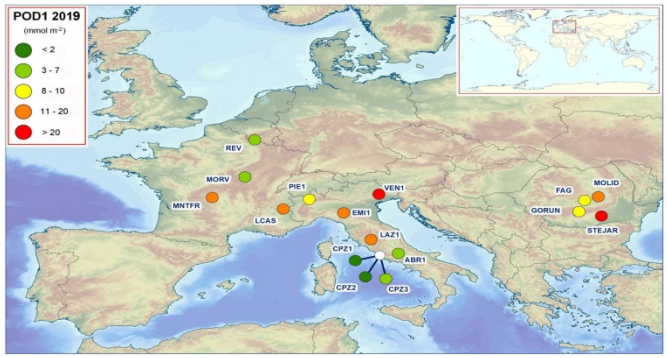


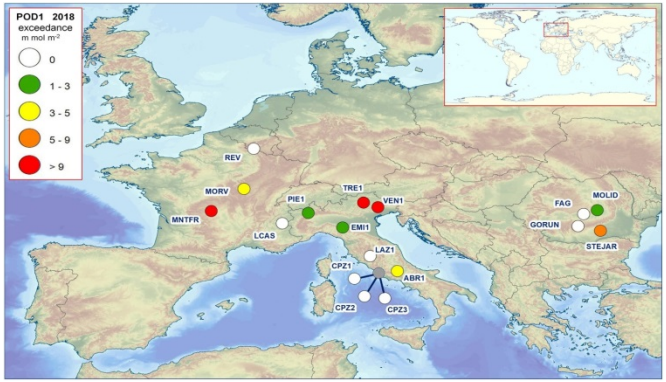


Tree species	CLec (nmol/mol h AOT40)	Response function	r	p value
Conifers (n = 15)	16,800	Y = 316.3*X + 8,909	0.58	0.032
Broadleaves (n = 30)	19,000	Y = 486.2*X + 6,842	0.58	0.002

POD1 levels and Exceedances







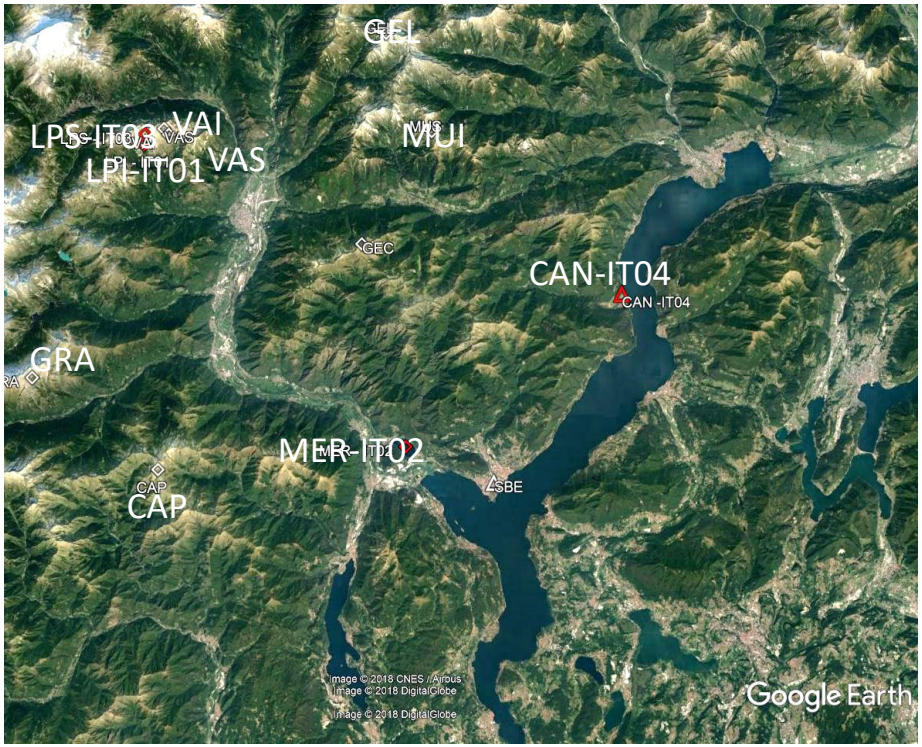
Tree species	CLef (mmol m^{-2} POD1)		Response function	r	p value
	0%	15%			
Conifers (n = 15)	4.8	9.0	Y = 0.28*X + 4.8	0.61	0.041
Broadleaves (n = 30)	11.7	18.6	Y = 0.46*X + 11.7	0.48	0.050

4 ICP WATERS in Italy (in Lake Maggiore watershed, Piedmont region)
1 subalbine river, 1 subalpine lake, 2 high altitude alpine lakes

In addition, 3 stations for the monitoring of atmospheric deposition chemistry (not ICP WATERS)

Sites are regularly monitored for water chemistry since late 1970'-early 1980' (base chemical variables, major ions, nutrients, heavy metals)

2019: Under the activities for the implementation of the NEC Directive in Italy, 6 extra sites (high altitude lakes) have been included in the monitoring. Furtherly, biological monitoring (macroinvertebrates and diatoms) has started at the high altitude lakes (8 sites in total)



Site	Code	Period	Altitude (m a.l.m.)	Catchment area (Km^2)
Lake Paione Inf.	IT01	1978-18	2002	1.26
Lake Paione Sup.	IT03	1978-18	2269	0.50
Lake di Mergozzo	IT02	1970-18	194	10.43
River Cannobino	IT04	1979-18	193	110.4

Activities in 2019-2020

- The chemical laboratory of CNR IRSA (national focal center for ICP WATERS) regulalrly took part to the chemical intercomparison organised by NIVA, Osolo
- 2019 data for Italian sites have been validated and sent to the Programme Center (NIVA) to be included in the ICP WATERS database
- National representatives took part to the Task Force meeting in Helsinki in 2019 and to the virtual Task Force meeting in 2020, organized by NIVA
- At the 2019 TF meeting, the Italian representative gave a presentation on the implementation of the NEC Directive in Italy, with a focus on freshwaters
- At the 2020 TF meeting, Italian representatives gave a presentation on the chemical and biological survey of high altitude Alpine lakes performed in 2019
- The monitoring of Italian sites in 2020 is going on. The next activities will focus on the assessment and development of suitable biological indexes for Italian sites, in collaboration with other national focal centers

Laboratory of Functional Ecology and Ecosystem Services, Department of Environmental Biology, Sapienza University of Rome

Responsable: Prof. Fausto Manes; **Reaserchers Involved**: Lina Fusaro, Elisabetta Salvatori, Alessandro Sebastiani

Research activities carried out in the framework of ICP Vegetation (from 2010 to 2019)

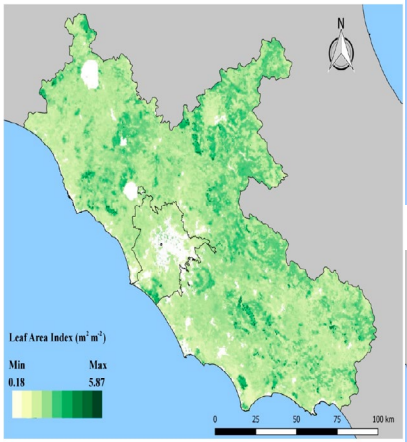
1) Analysis of effects of tropospheric ozone (O_3) and nitrogen deposition on natural and semi-natural species;

2) Biomonitoring field campaigns on bio-indicators species following ICP Vegetation protocols;

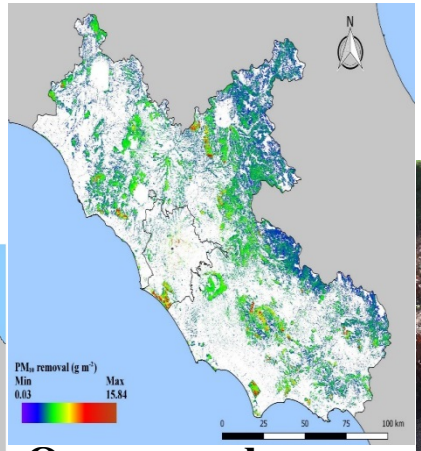
3) Ozone garden pilot experiment realized at the Experimental Garden, Department of Environmental Biology, Sapienza University of Rome (season 2019);

4) Mapping and assessment of Regulating Ecosystem Services (ES) provided by urban and peri-urban vegetation as Ozone and PM_{10} removal; quantification of the monetary value of these ES.

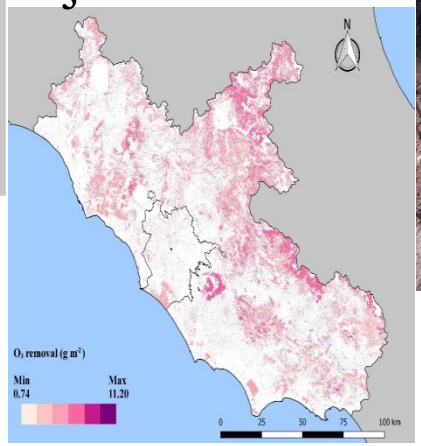
Leaf Area Index



PM_{10} removal



O_3 removal



Ozone garden

Partecipation to different sections of the Scientific Background document.

The TF took note of progress with the development of new chapters for Scientific Background Document B (SBD-B), associated with Chapter 3 of the Modelling and Mapping Manual of the LRTAP Convention. The table below provides an overview of the topics proposed for inclusion, who is taking the lead and who is going to contribute (subject to available funding). Topics highlighted in bold are ready for inclusion in SBD-B in 2020.

Topic	Lead	Contributions
Guidelines for gap filling in data required for ozone flux modelling	Felicity Hayes (Coordination Centre, UK)	Kirsti Ashworth (UK), Sabine Braun (Switzerland), Victoria Bermejo (Spain)
Interactive impacts of ozone and nitrogen on crops	Håkan Pleijel (Sweden)	Coordination Centre (UK)
Guidelines for assessing ozone-induced foliar damage and yield loss of horticultural crops	Ignacio González Fernández and Victoria Bermejo (Spain)	Vicent Calatayud (Spain), Giacomo Gerosa and Riccardo Marzuoli (Italy)
Impacts of ozone on pasture quality	Felicity Hayes (Coordination Centre, UK), Ignacio González Fernández (Spain)	
Ozone flux-effect relationships and methodology for net annual increment (NAI) of trees	Lisa Emberson (UK)	Sabine Braun (Switzerland), Per Erik Karlsson (Sweden)
Ozone removal by vegetation in urban areas	Lina Fusaro and Fausto Manes (Italy)	Rocio Alonso (Spain), Pierre Sicard (France), Giacomo Gerosa (Italy)
Validation of soil moisture index used in EMEP model	Ignacio González Fernández (Spain)	Sabine Braun (Switzerland), Vicent Calatayud and Arnaud Carrara (Spain), Giacomo Gerosa and Riccardo Marzuoli (Italy), Lisa Emberson (UK), Per Erik Karlsson (Sweden), David Simpson (Sweden, EMEP/MSC-West)
Ozone-induced injury guidance for educational and awareness raising purposes	Klaudia Borowiak (Poland)	Felicity Hayes (UK), Felix Leung (Hong Kong, China), Vicent Calatayud and Victoria Bermejo (Spain)
Critical levels for ozone-sensitive clones of poplar	Yasutomo Hoshika (Italy)	Vicent Calatayud (Spain), Riccardo Marzuoli (Italy), Pierre Sicard (France)
Ozone impacts on insects	Valda Araminiene (Lithuania)	Coordination Centre (UK)
Improved phenology for ozone flux modelling in trees	Sabine Braun (Switzerland)	Per Erik Karlsson (Sweden)

Ongoing Projects

Integrative approach to biomonitoring the Particulate Matter in urban areas carried out at leaf level

Ozone Garden activity planned in Spring/Summer 2021.

Italian participation to the International Cooperative Programme on Effects on Materials including Historic and Cultural Monuments (ICP Materials)

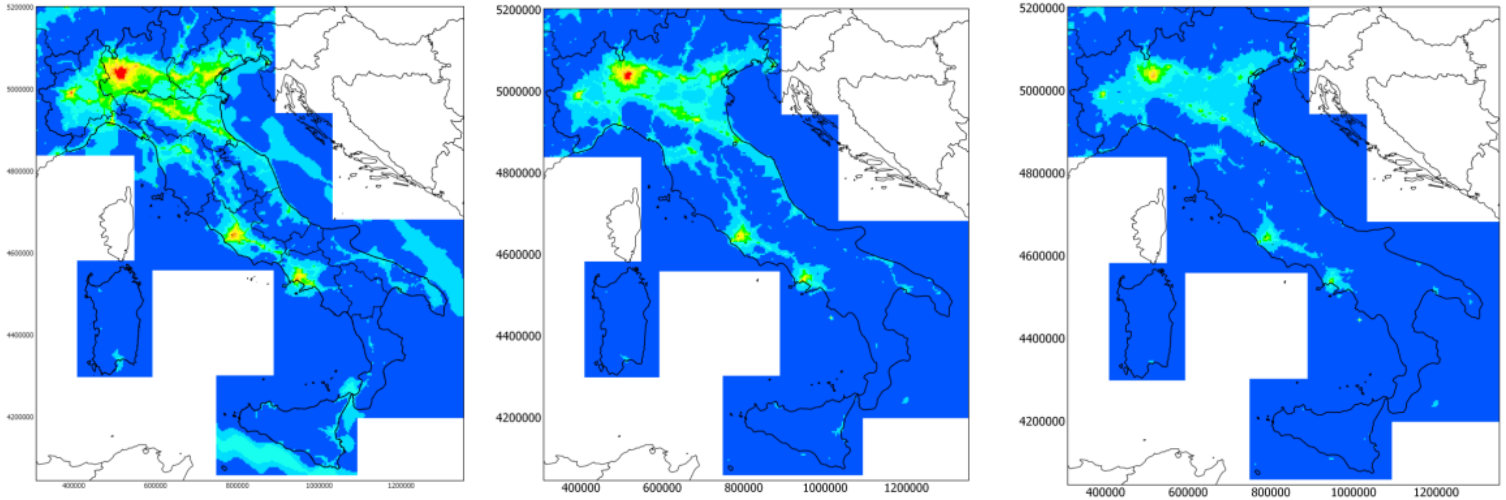
Exposure for trend analysis: participation to the exposure programme for estimation of corrosion and soiling on different materials samples and collecting of environmental parameters (meteo and pollutants). Three stations involved: Milan (urban station), Rome (urban station) and Casaccia (rural station).

	For any year from 2020 to 2029	For any year from 2030	Reduction from 2020 to 2030
SO_2	59 %	79 %	48.8%
NO_x	42 %	63 %	36.2%
NMVOC	28 %	40 %	16.7%
NH_3	6 %	19 %	13.8%
$PM_{2.5}$	22 %	49 %	34.6%

NEC Directive: The National Emission Ceilings Directive (NECD, 2016/2284/EU) sets objectives for emission reduction for SO_2, NOx, NMVOCs, NH_3 and $PM_{2.5}$ for each Member State.

The magnitude of reduction commitments is comparable with the requirements for the protection of cultural heritage and will produce a reduction in maintenance/restoration costs due to air pollution.

NO_2, μg/m³



2010 2020 2030

Use of the forecasts of the national model MINNI (4x4km) to verify the air concentrations by 2030 at the Italian UNESCO sites.