ISCLEANAIR
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AIR POLLUTION ABATEMENT

IMPROVING THE CITY'S AIR QUALITY

Smart Clean Air City

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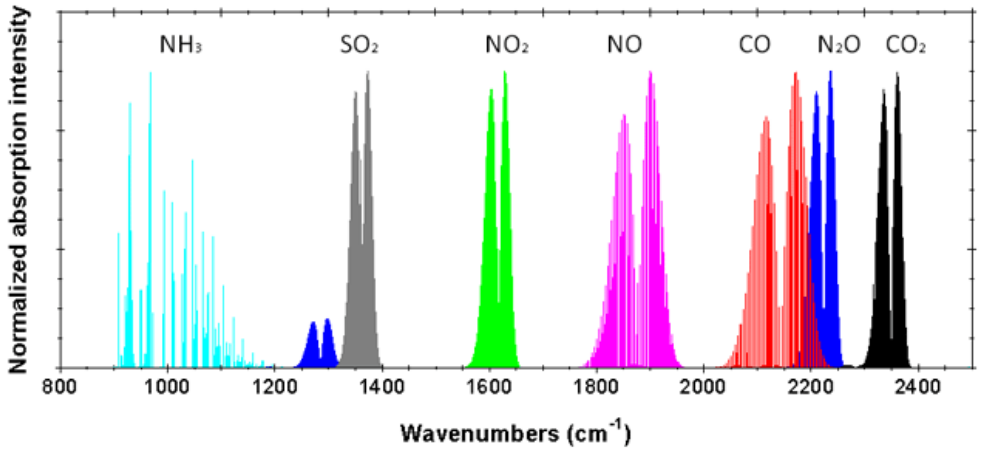
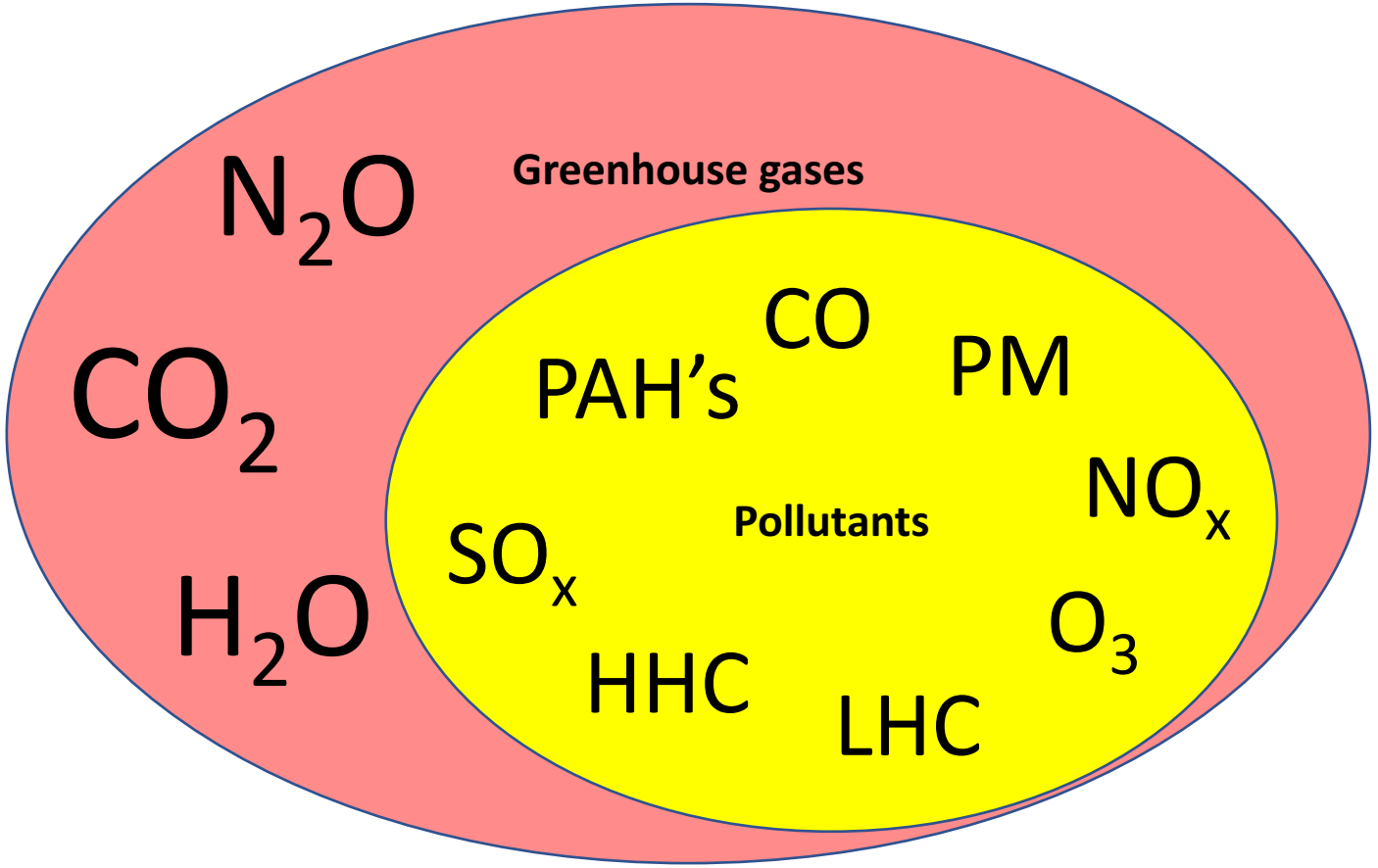
AIR POLLUTION ABATEMENT

AIM

innovative approach to have **clean air**, healthy environment in our **cities**



PARADIGM SHIFT




She's Alive
She's
HOME

FRAMEWORK

Pollution is a real huge problem

- Traffic
- Residential & Services
- Industries
- Farms & Agriculture

FRAMEWORK

In our Cities we have mainly two macro sector of emission

- Traffic 50% → *Cars, Trucks, Buses, Airplanes, Train, Ships*
- Residential & Services 50% → *House, Schools, Hospitals, Offices, Shops*

FRAMEWORK

In our Cities we have high density pollutant's sources

- Traffic → *High density of mobile pollutant's sources*
- Residential & Service → *High density of fixed pollutant's sources*

FRAMEWORK

High density pollutant's sources

- Traffic → *Internal Combustion Engines emissions*; *Brakes emissions*; *Tires emissions*; *Dust raising emissions*
- Residential & Service → *Sanitary water emissions*; *Heating – Cooling system emissions*; *Waste water emissions*; *Urban waste emissions*; *Kitchen emissions*

AIR POLLUTION EMISSION SOURCES

WE ARE RESPONSIBLE FOR ALL EMITTED POLLUTANTS

R: Residential

T: Transport

I: Industry

O: Other

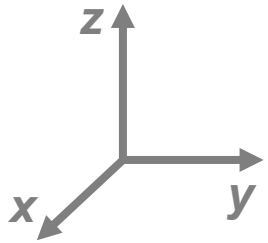
- Farm
- Agriculture/Food Processing
- Urban Waste Disposal
- Waste Processing

$$EMISSION = \int_V R d\Omega + \int_V T d\Omega + \int_V I d\Omega + \int_V O d\Omega$$

AIR POLLUTION CONCENTRATION DUE TO DEPLETION

$$DEPLETION = \int_V D d\Omega + \int_V W d\Omega + \int_V Z d\Omega + \int_V XY d\Omega + \int_V P d\Omega$$

D: Dry Depletion
W: Wet Depletion
Z: Axis Z Dispersion
XY: Axis XY Dispersion
P: Photo Chemical Reaction



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AIR POLLUTION BALANCE

AIR POLLUTION ABATEMENT

IN OUR TOWNS THE BALANCE OF AIR POLLUTION CONCENTRATIO RESULTS IN THE FOLLOWING **BALANCE** RELATIONSHIP:

$$BALANCE = EMISSION - DEPLETION$$

UNHEALTHY DANGEROUS POLLUTANT CONCENTRATION

AIR POLLUTION REMEDIATION ACTIONS ARE URGENT AND MANDATORY

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AIR POLLUTION ABATEMENT

TO DECREASE THE AIR POLLUTION CONCENTRATION IN OUR TOWNS
A DISTRIBUTED NETWORK OF
AIR POLLUTION ABATEMENT SYSTEM
IS PROPOSED

TO ACT AGAINST DENSE, FIXED AND MOBILE
DISTRIBUTED EMISSION SOURCES
THE AIR POLLUTION ABATEMENT SYSTEM NETWORK MUST BE
DENSELY DISTRIBUTED

AIR POLLUTION ABATEMENT

ABATEMENT : AIR POLLUTION CONCENTRATION DUE TO **APA**

$$ABATEMENT = \int_V A d\Omega$$

$$BALANCE = EMISSION - DEPLETION - ABATEMENT$$

HEALTHY AIR

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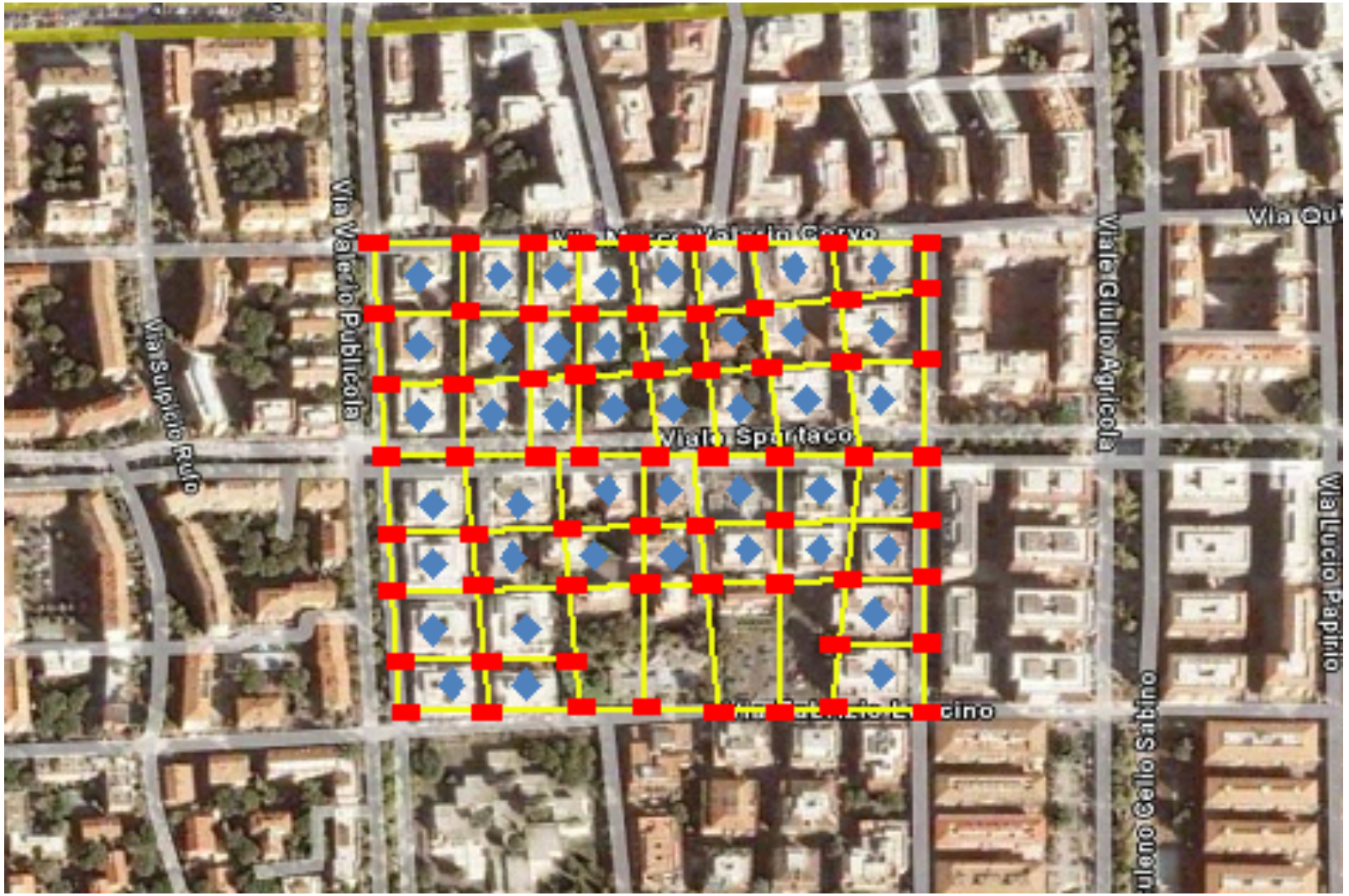
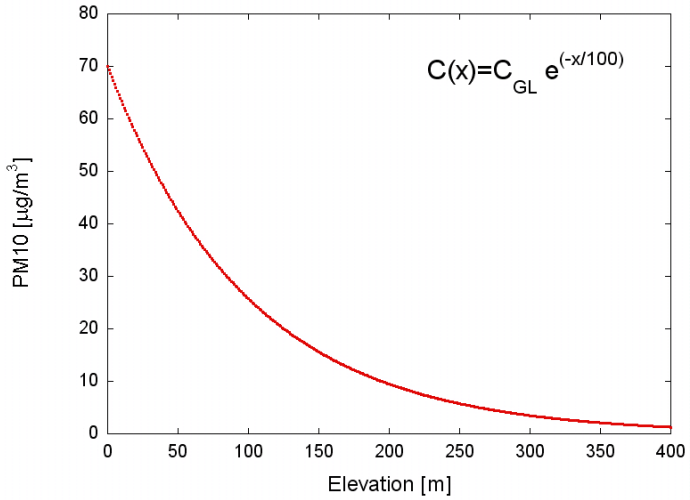
AIR POLLUTION ABATEMENT

AIR POLLUTION ABATEMENT



EXAMPLE OF ACTION

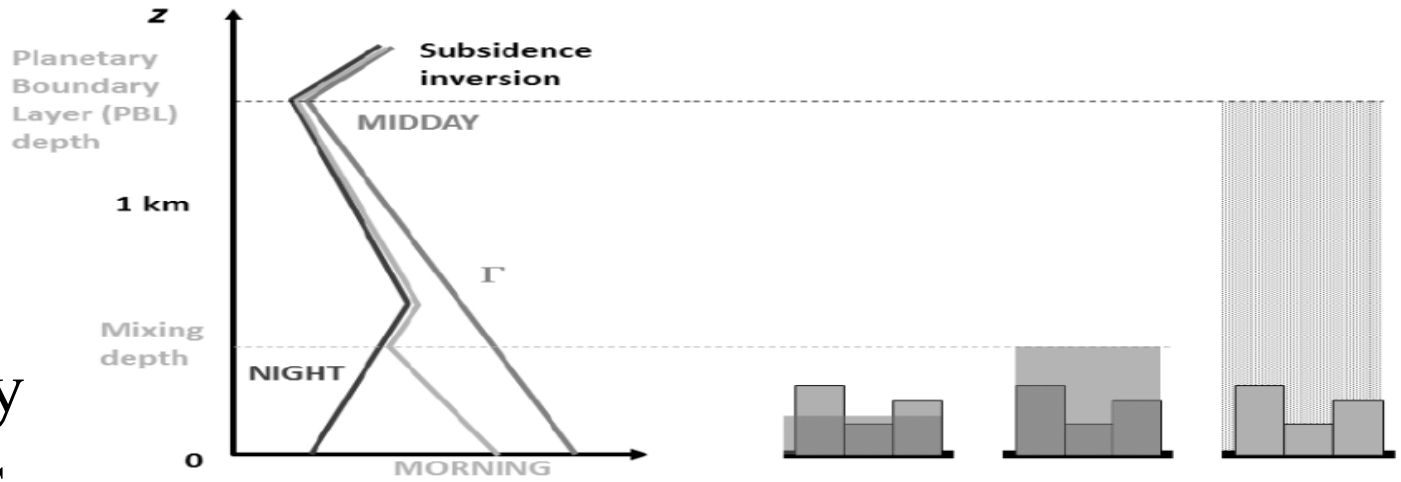
- TRAFFIC
- RESIDENTIAL
- APA

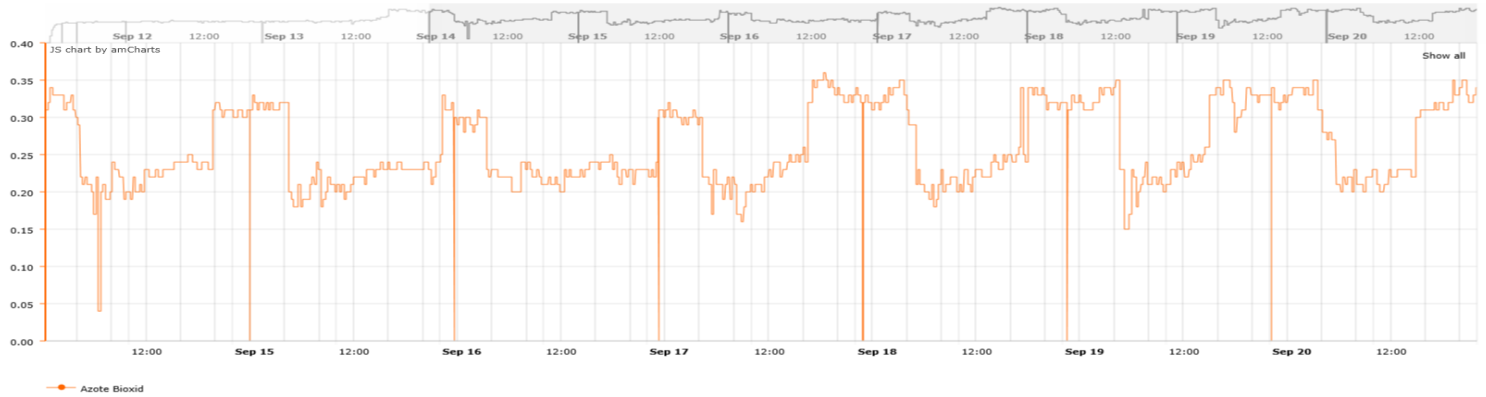


AIR POLLUTION ABATEMENT

Outdoor and **Indoor** spaces differ only for the volume

The decontamination differs only for the number of APA's systems hence for the remediation time





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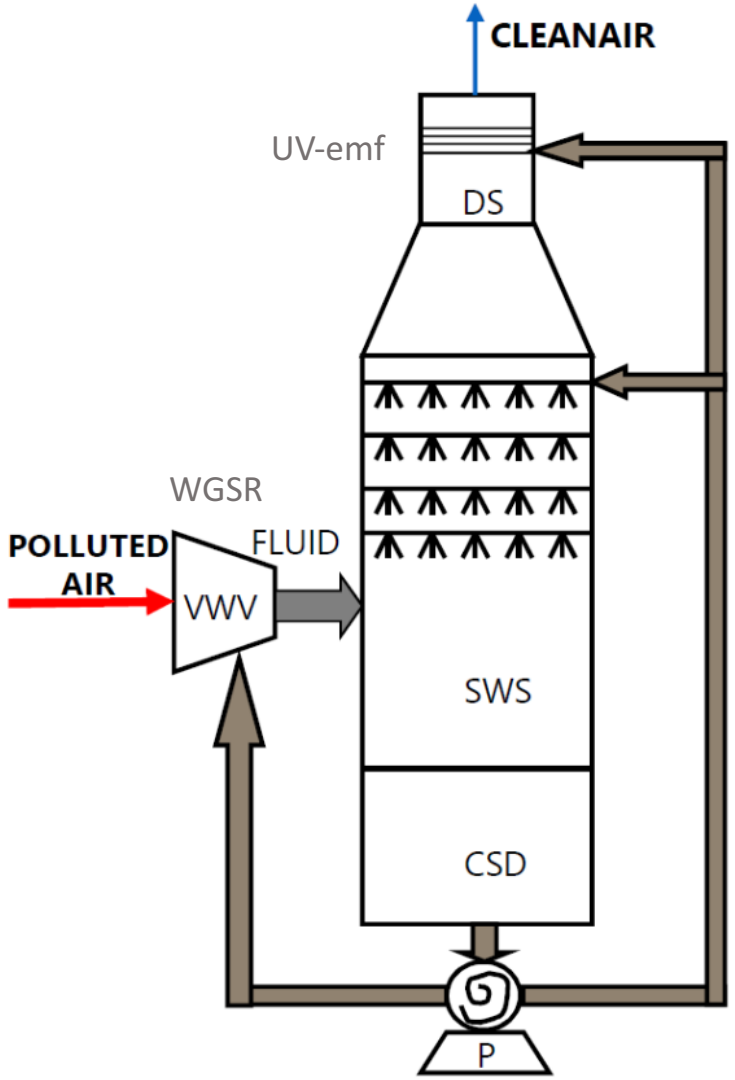
AIR POLLUTION ABATEMENT

TECHNOLOGY

- Particulate Matter – high efficiency
- Heavy Metals – high efficiency
- PAH's – high efficiency
- Ozone – high efficiency
- CO – low/high efficiency
- NOx – medium/high efficiency
- SOx – medium/high efficiency
- Light HC – low/high efficiency

WGSR: WATER GAS SHIFT REACTION
VWV: VERY WEAK VENTURI
SWS: SHOWER WET SCRUBBER
CSD: CHEMICAL SOLUTION DRAIN
DS: DEPOSITION STACK
UV-emf: UV photo catalysis metal induced



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AIR POLLUTION ABATEMENT – CASE STUDY

AIR POLLUTION ABATEMENT

CITY OF AQUILA IS A POLYGON OF ABOUT **24Km**

WE APPROXIMATE IN A SURFACE OF **32Km^2**

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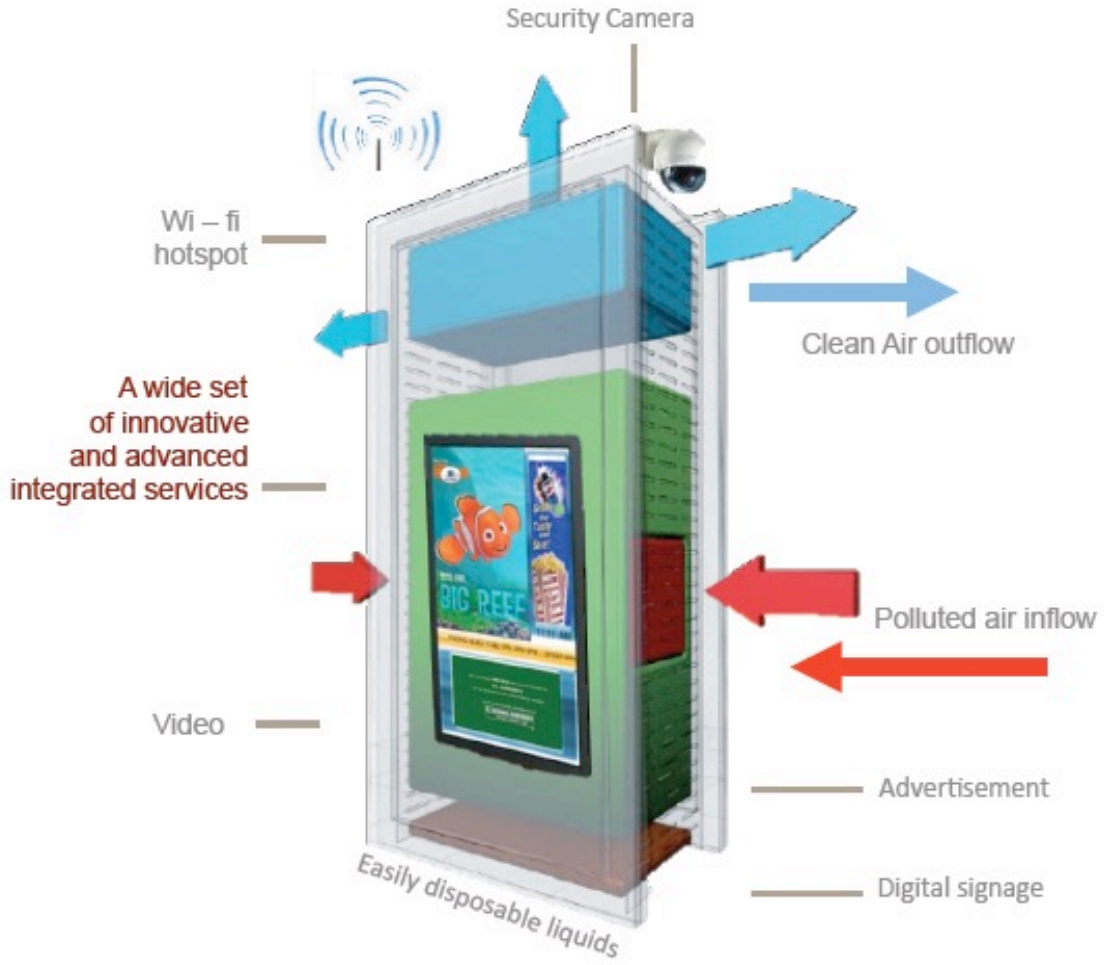
AIR POLLUTION ABATEMENT

AIR POLLUTION ABATEMENT – CASE STUDY



VOLUME UNDER CONSIDERATION OF
32Km^2 x 30m HEIGHT
V=10^8 m^3

CONSIDER THE USE OF
138 APA (3000Nm^3/h)

PROCESSED AIR VOLUME
V=10^7 m^3/day

ABOUT 10 DAYS TO PROCESS ALL THE AIR VOLUME

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AIR POLLUTION ABATEMENT

AIR POLLUTION ABATEMENT – CASE STUDY

IMPROVING AIR QUALITY
IN THE NETWORK IS
ONLY A TIME QUESTION

STREET LIGHT
INSTALLED POWER 1MW
(10K LAMP OF 100W)

TOTAL APA INSTALLED
POWER 70KW

POWER SUSTANAIBILITY

ABOUT 7%

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AIR POLLUTION ABATEMENT

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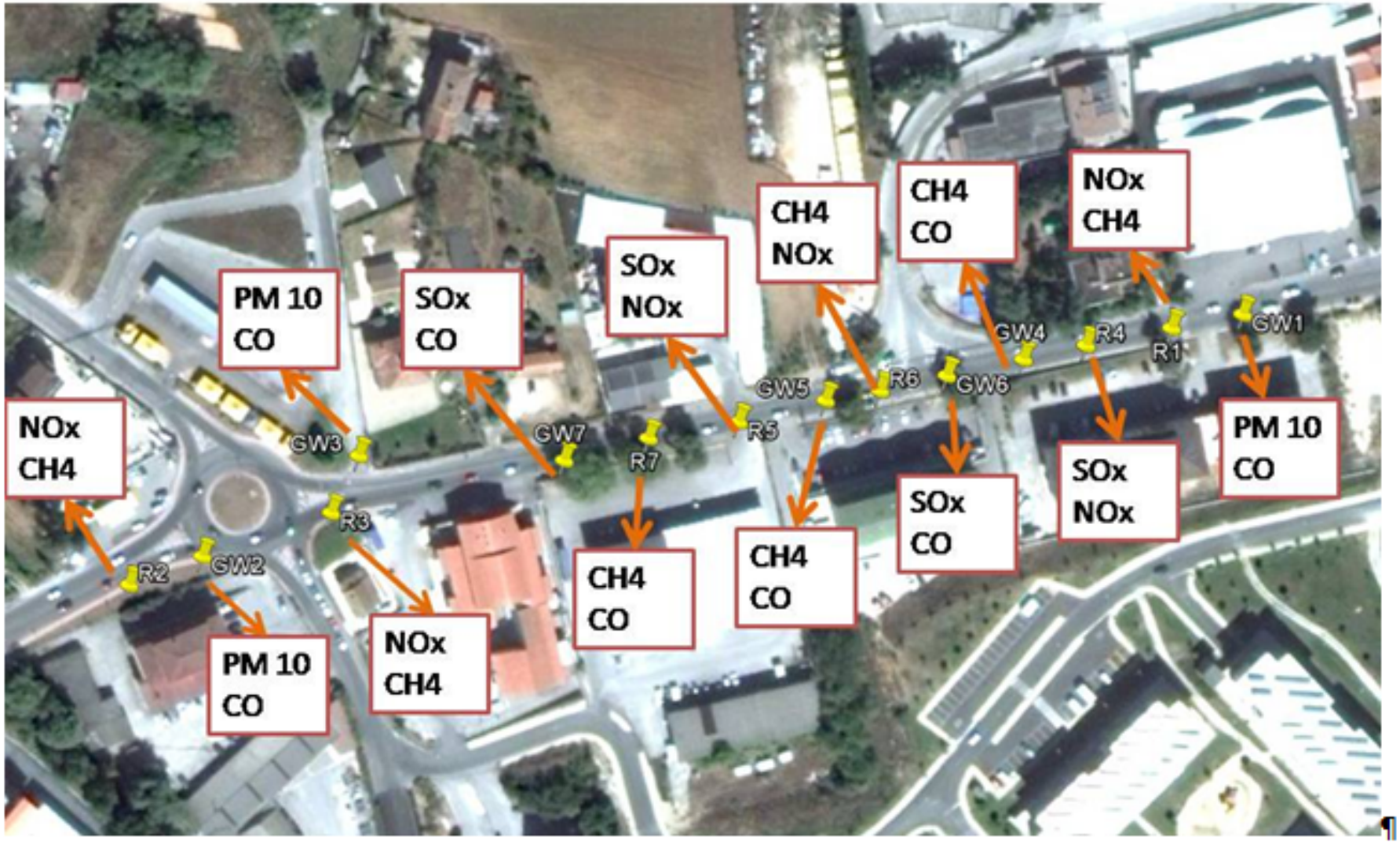
FIRST SMART CLEAN AIR CITY



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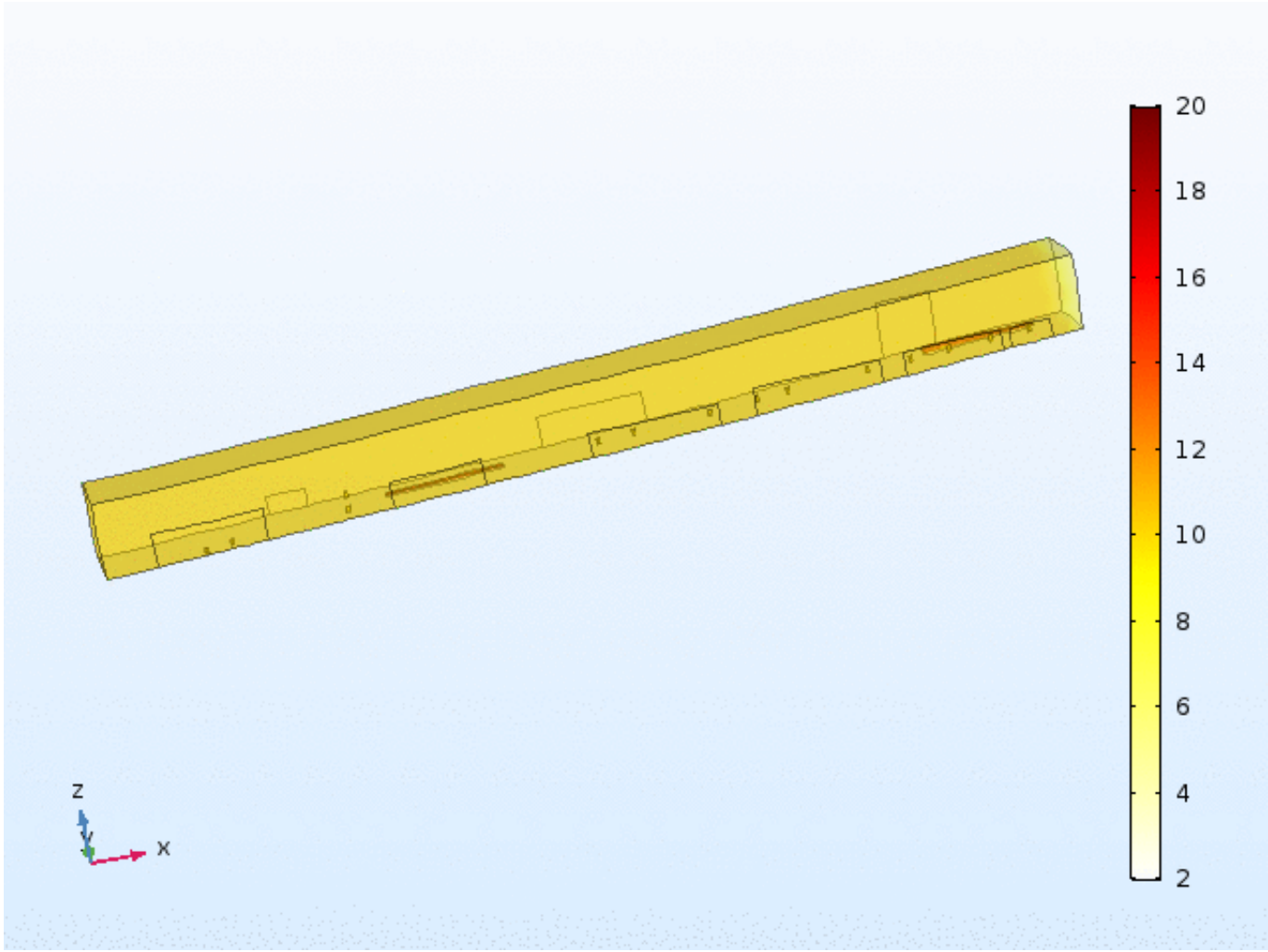
AIR POLLUTION ABATEMENT



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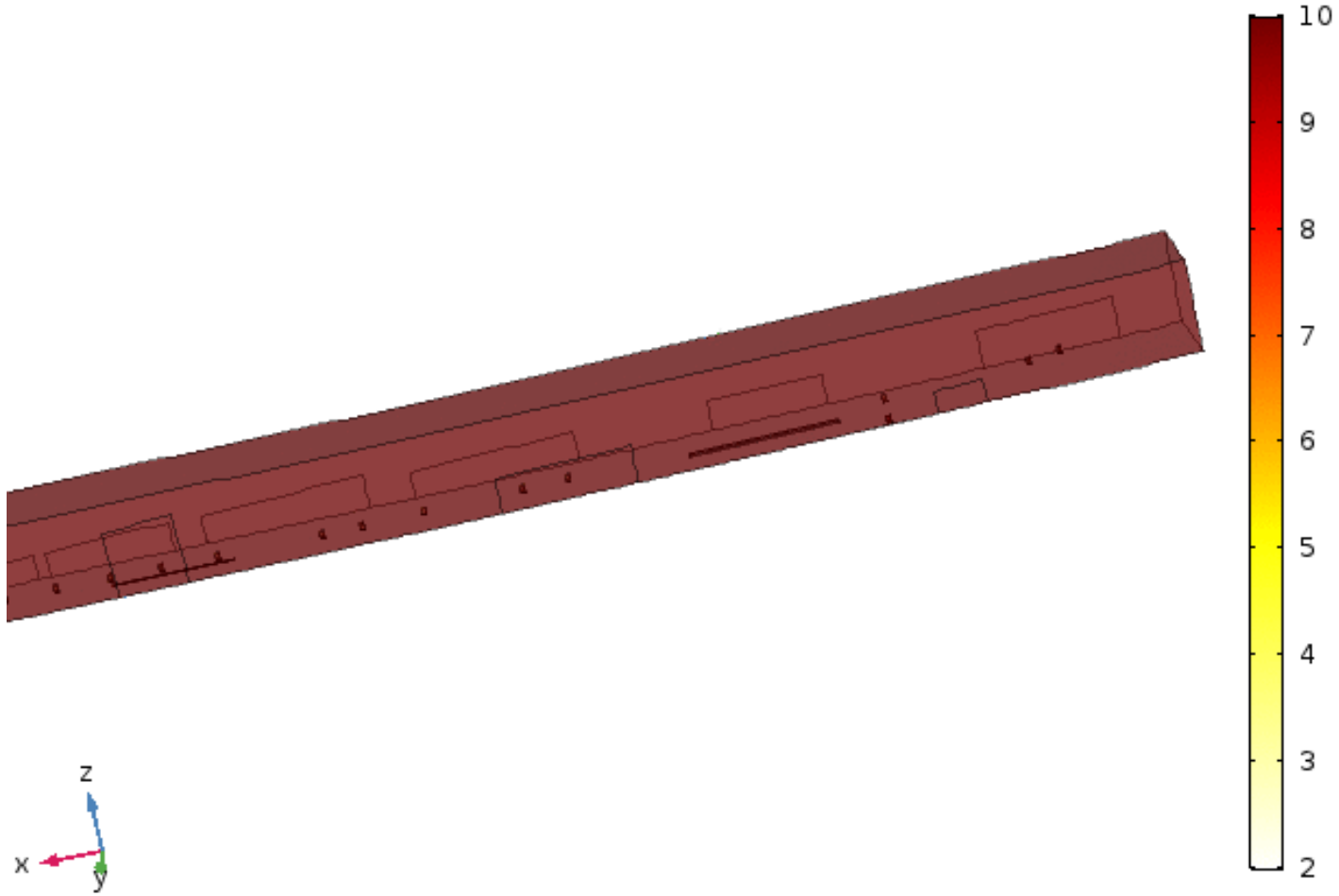

DISSEMINATION

environments

MDPI

Article

L'Aquila Smart Clean Air City: The Italian Pilot Project for Healthy Urban Air

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