SMART BUILDING AS A HEART OF THE SMART CITY

presented by DARIUSZ STASIK

SMART BUILDING CENTER

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THE FUTURE OF THE CITIES

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Problem no 1 – POPULATION GROWTH

In the cities there are more than 3.6 million people living – 50% of our population

… although the cities occupy only 2% of the Earth surface

By 2050 the cities will be living more than 6.0 million people

Every week the towns grow by 1.0 million of new citizens

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THE FUTURE OF THE CITIES

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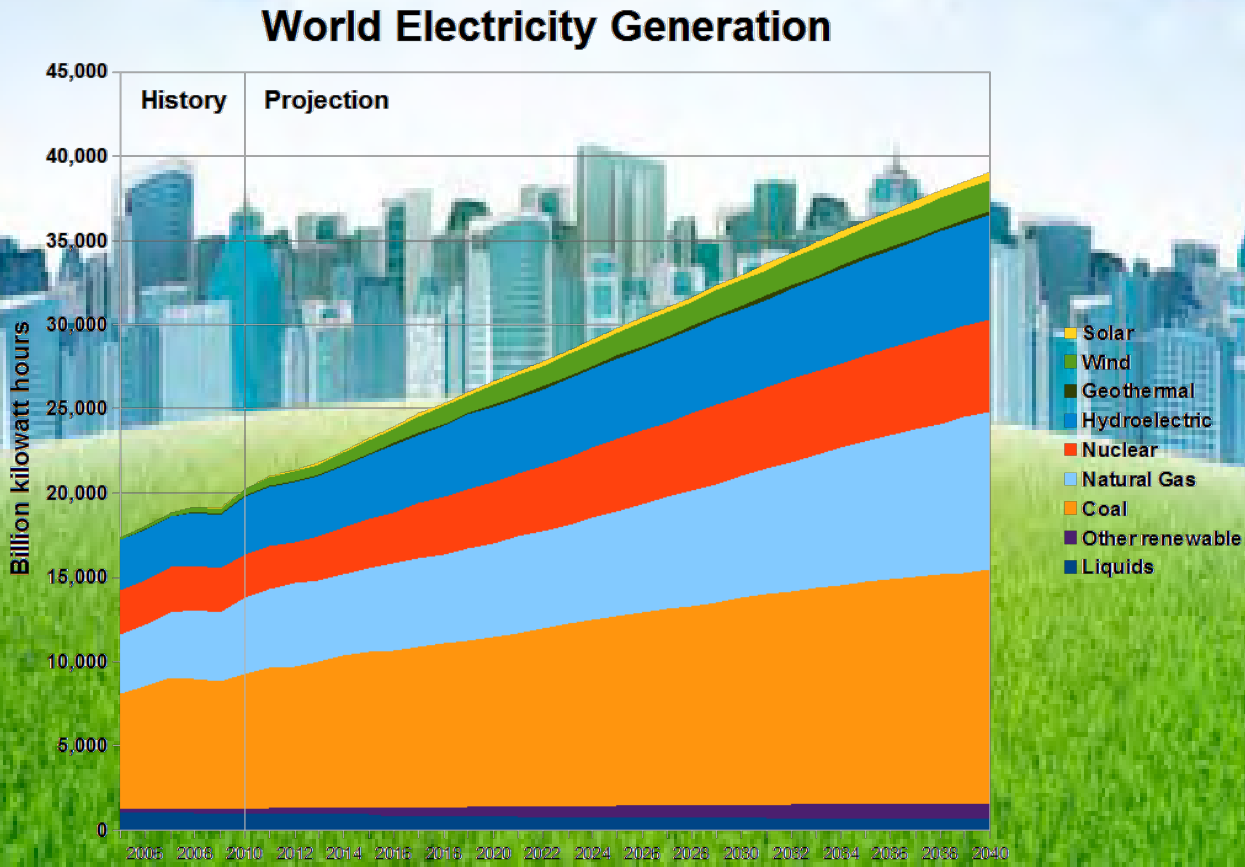
Problem no 2 – ELECTRICITY CONSUMPTION

The cities are consume 70% of the electricity produced in the world

40% of energy consumption absorbs lighting of buildings



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THE FUTURE OF THE CITIES

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Problem no 3 – MOBILITY - TRAFFIC

The cities are required complete mobility solutions for fast, efficient and affordable system of mass transit to move people and goods economically, quickly and safety using airports, harbour, roads and railways.

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THE FUTURE OF THE CITIES

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Problem no 4 - SMOG

Cities with the worst outdoor air pollution

Pollution is defined as airborne particles less than 10 micrometers in diameter (PM10). Values shown are annual averages in micrograms per cubic meter of air.

Overall

Ahwaz, Iran	372
Ulaanbaatar, Mongolia	279
Sanandaj, Iran	254
Ludhiana, India	251
Quetta, Pakistan	251
Kermanshah, Iran	229
Peshawar, Pakistan	219
Gaborone, Botswana	216
Yasouj, Iran	215
Kanpur, India	209

India

Ludhiana	251
Kanpur	209
Delhi	198
Lucknow	186
Indore	174
Mumbai	132
Bangalore	90

FIVE MOST POLLUTED

OTHER CITIES OF INTEREST

China

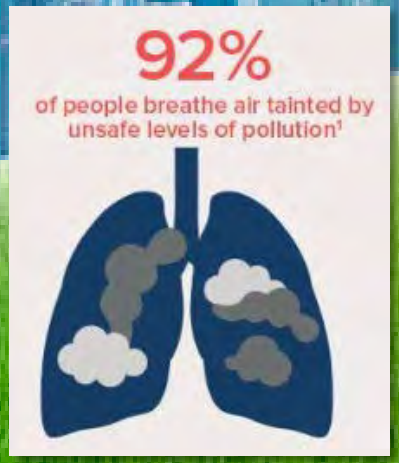
Lanzhou	150
Xining	141
Urumqi	140
Jinan	123
Beijing	121
Shanghai	81
Hong Kong	50

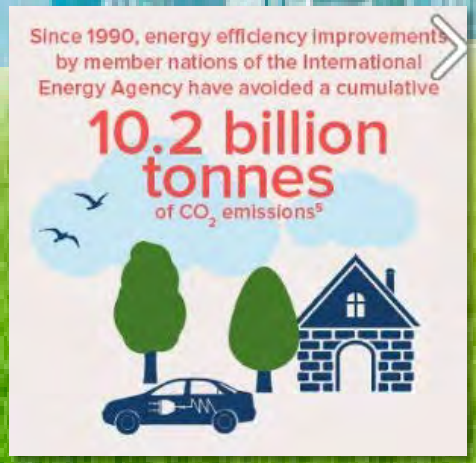
European Union

Plovdiv, Bulgaria	70
Sofia, Bulgaria	68
Kraków, Poland	64
Pleven, Bulgaria	57
Thessaloniki, Greece	56
Paris	38
London	29
Berlin	26

United States

Bakersfield, CA	38
Fresno, CA	35
Riverside, CA	28
Fairbanks, AK	27 — *Also Hilo, HI, Modesto, CA, and Visalia, CA*
Los Angeles	25
Chicago	22
New York	21





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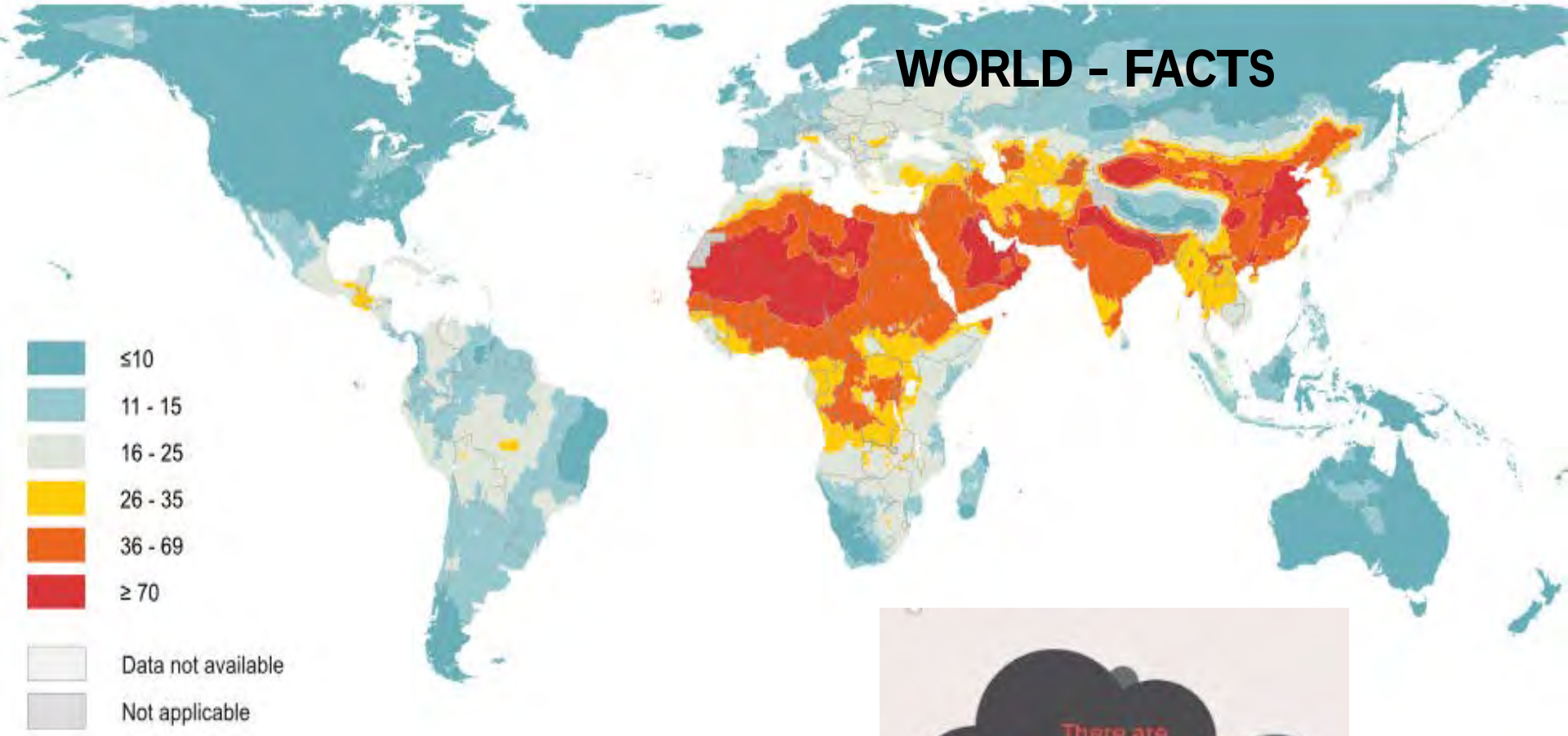
WORLD - FACTS



THE LEVEL OF PM 2,5 IN THE WORLD

POLAND – FACTS

45.000 people were died in 2015 caused by SMOG

3.500 people were died in 2015 in cars accidents only !

4 polish cities in 10 TOP most polluted cities in EUROPE by SMOG

Most polluted polish city – Krakow has special app informing citizens about the level of PM 2,5 with alert function to better stay at home

whether such a city can be a smart city?

BREATHELIFE

THE AIR POLLUTION IN

NEW YORK CITY, NY

← SEARCH ANOTHER CITY

*PM 2.5 concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

HELSINKI, FINLAND

SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

OSLO , NORWAY

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

LONDON , THE UNITED KINGDOM

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

BERLIN, GERMANY

SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

AMSTERDAM , THE NETHERLANDS

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

PARIS, FRANCE

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

Interim target 1 (15)

Associated with 6% lower premature mortality risk relative to Interim Target 2 (25 µg/m3)

BREATHELIFE

THE AIR POLLUTION IN

MOSCOW, THE RUSSIAN FEDERATION

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

POZNAN , POLAND

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

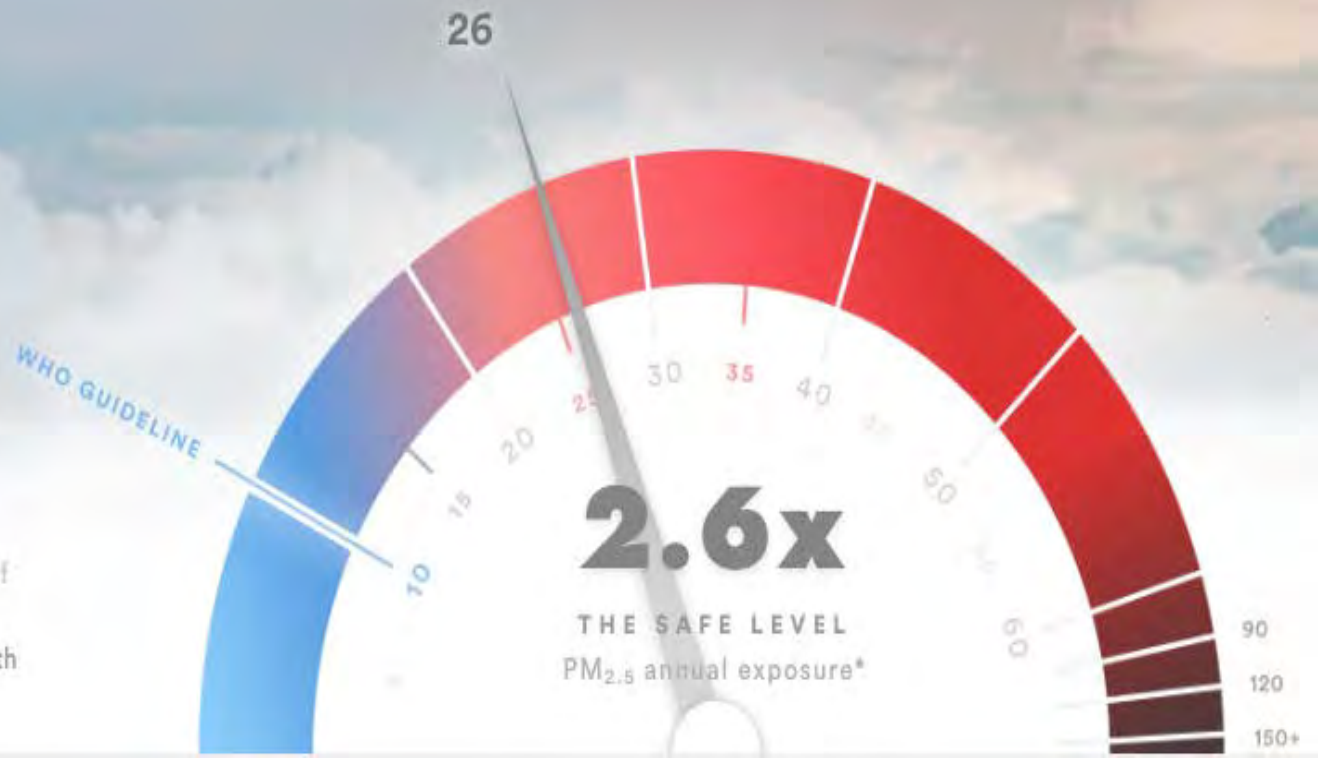
Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

WARSAW , POLAND

SEARCH ANOTHER CITY



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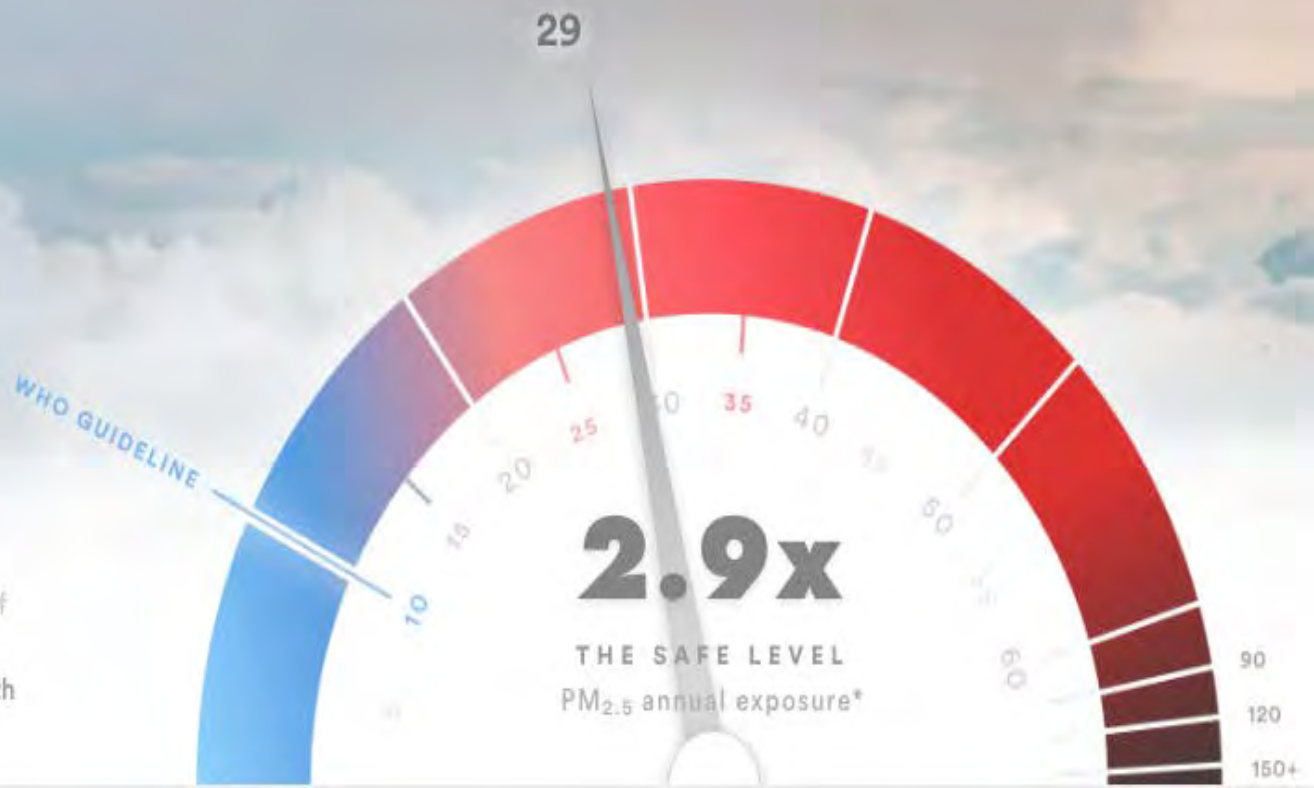
Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

TBILISI, GEORGIA

← SEARCH ANOTHER CITY



*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

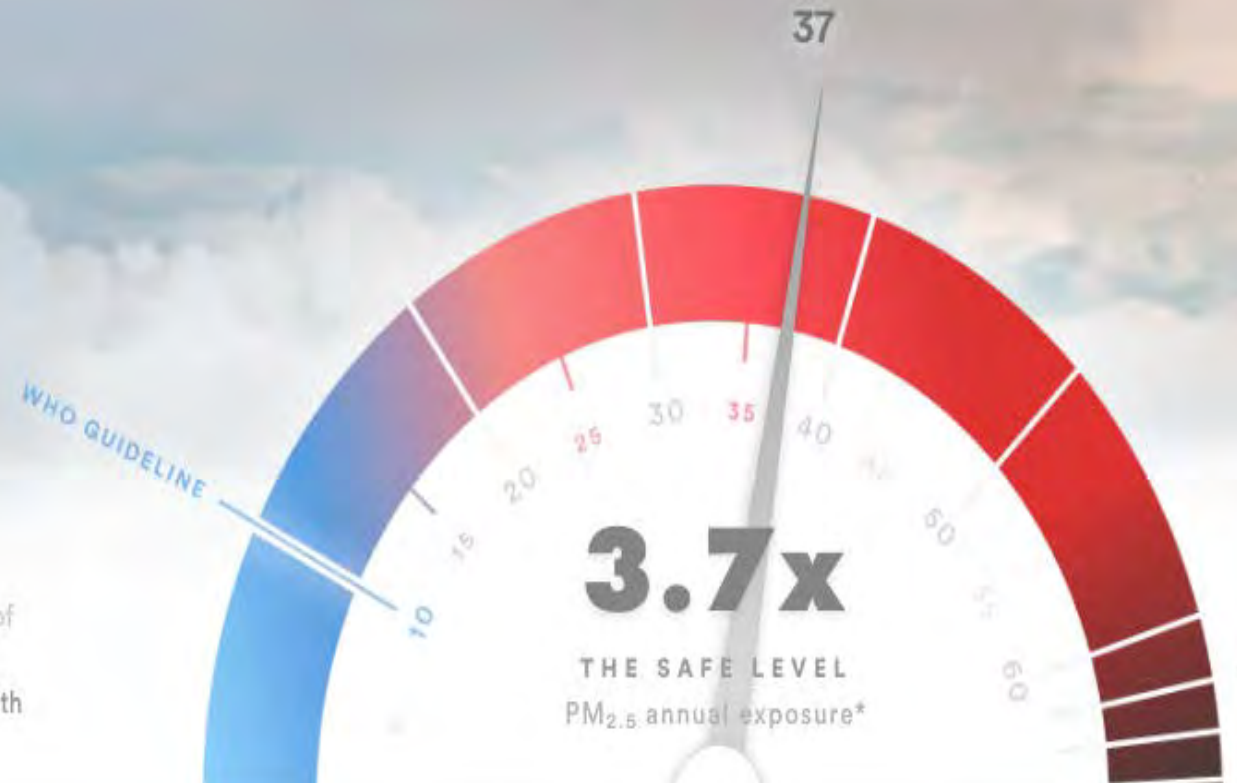
Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

CRACOW , POLAND

← SEARCH ANOTHER CITY



*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

THE AIR POLLUTION IN

BEIJING , CHINA

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health

BREATHELIFE

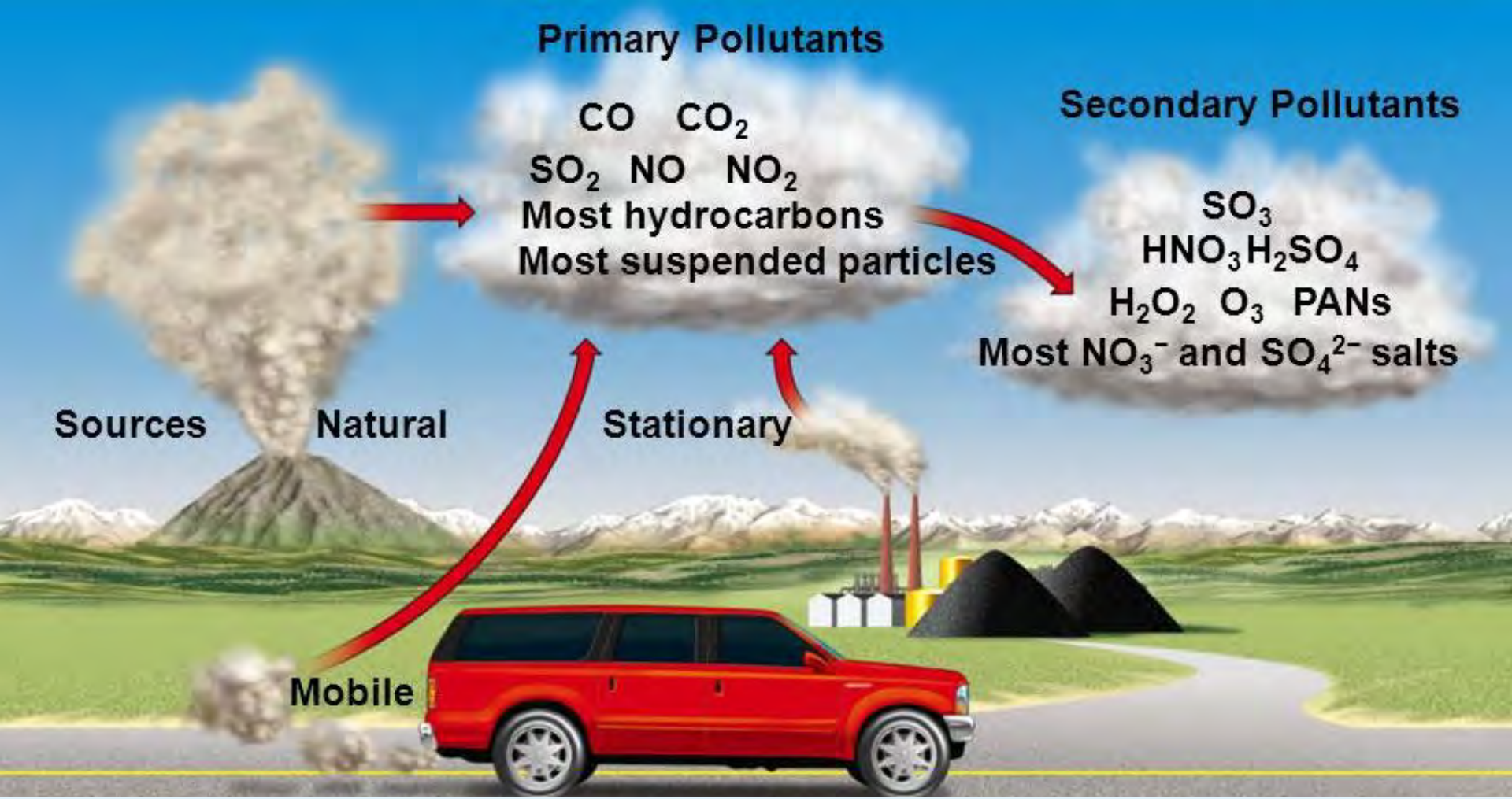
THE AIR POLLUTION IN

DELHI , INDIA

← SEARCH ANOTHER CITY

*$PM_{2.5}$ concentrations measured in micrograms of particles per cubic meter of air (µg/m3)

Data: WHO Global Platform on Air Quality & Health



PM_{10} is roughly one-seventh the diameter of a normal human hair. It consists of sulfate, nitrates, ammonia, sodium chloride, and black carbon; it may also include concentrations of natural windblown dust. PM_{10} is harmful to health because it can block and inflame nasal and bronchial passages, causing a variety of respiratory-related conditions that lead to illness or death. PM_{10} is a major component of indoor air pollution and forest fires.[22,23]

$PM_{2.5}$ is often considered even more dangerous to human health because of its ultrafine size (about 1/30th the average width of a human hair). Not only can $PM_{2.5}$ penetrate deep inside the lungs, but it can also enter the bloodstream, causing a variety of health problems including heart disease and other cardiovascular complications. $PM_{2.5}$ is often the result of fossil fuel combustion from vehicle exhaust, industrial production and power plants, as well as from natural sources such as windblown dust and volcanic activity.[24]

CLEAN CITY AIR - SOLUTIONS

CITY BIKE RENTAL NETWORK

CLEAN CITY AIR - SOLUTIONS

CITY BIKE RENTAL NETWORK

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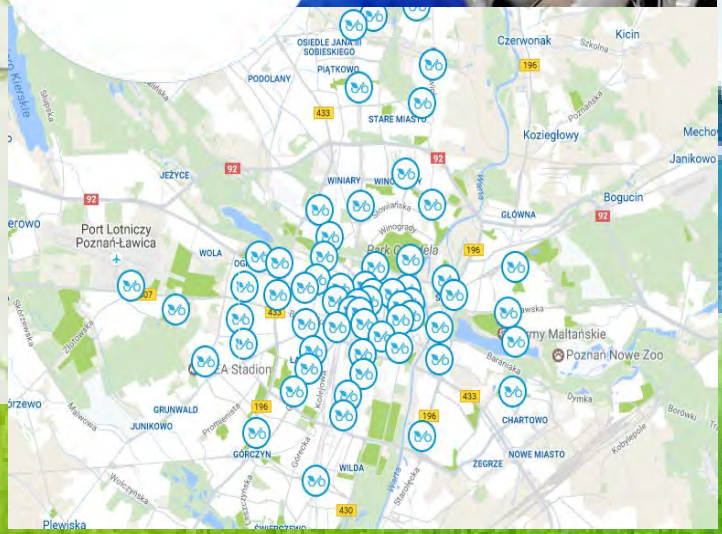
PRM
POZNAŃSKI ROWER MIEJSKI



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CLEAN CITY AIR - SOLUTIONS

CITY ELECTRICAL CARS RENTAL NETWORK

SMART BUILDING CENTER

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CLEAN AIR - SOLUTIONS

CITY CENTER RING FOR ELECTRICAL CARS ONLY

CLEAN CITY AIR - SOLUTIONS

SMART BUILDING CENTER

SYSTEM OF CITY CHARGING STATIONS FOR ELECTRICAL CARS

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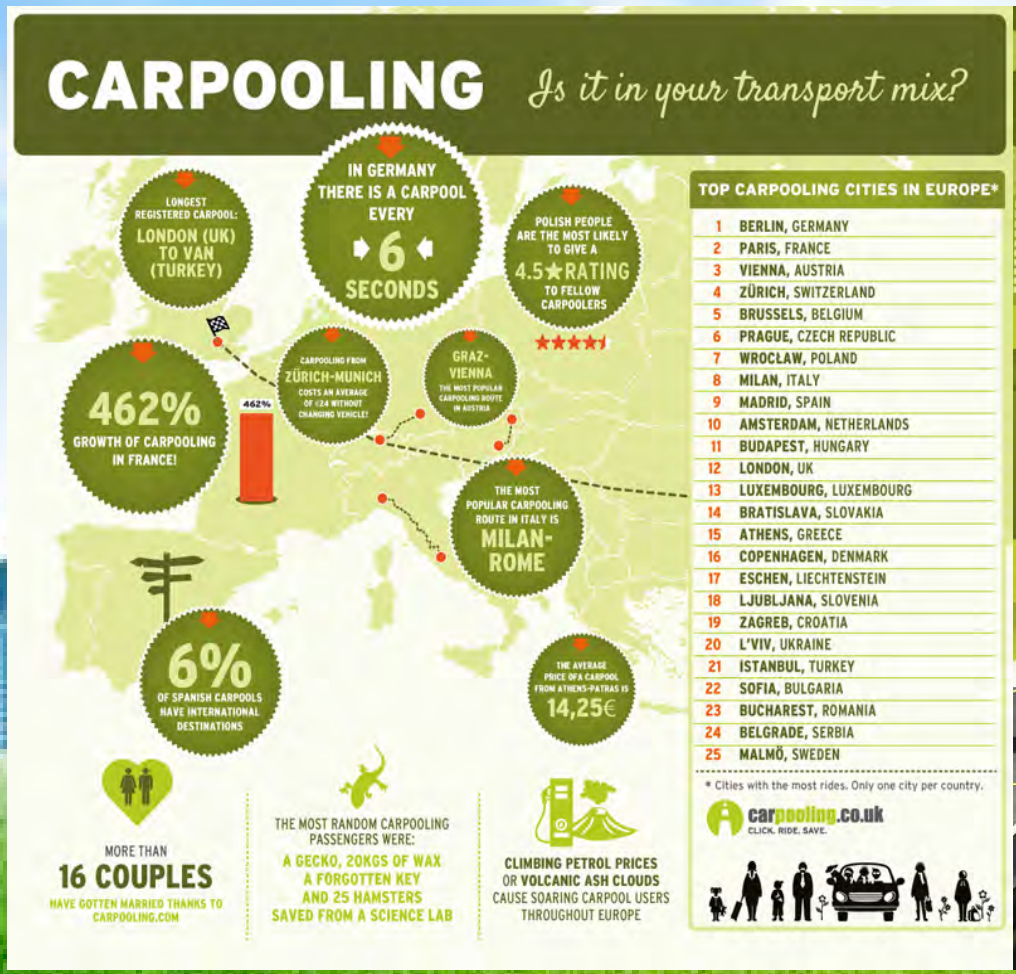
CLEAN CITY AIR - SOLUTIONS

CARPOOLING



CLEAN CITY AIR - SOLUTIONS

ELECTRICAL BUSES IN PUBLIC TRANSPORT

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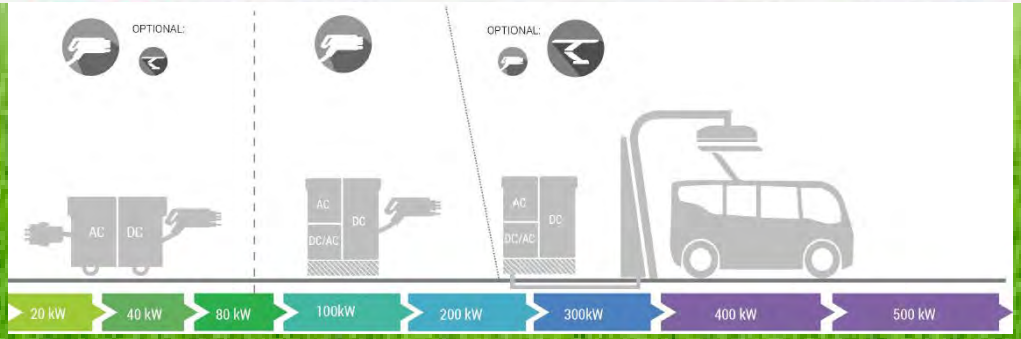

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CLEAN CITY AIR - SOLUTIONS

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ELECTRIC RE-CHCARGING LINE

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CLEAN CITY AIR - SOLUTIONS

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RENEWABLE ENERGY SOURCES

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CLEAN CITY AIR - SOLUTIONS

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ENERGY STORAGE SYSTEMS

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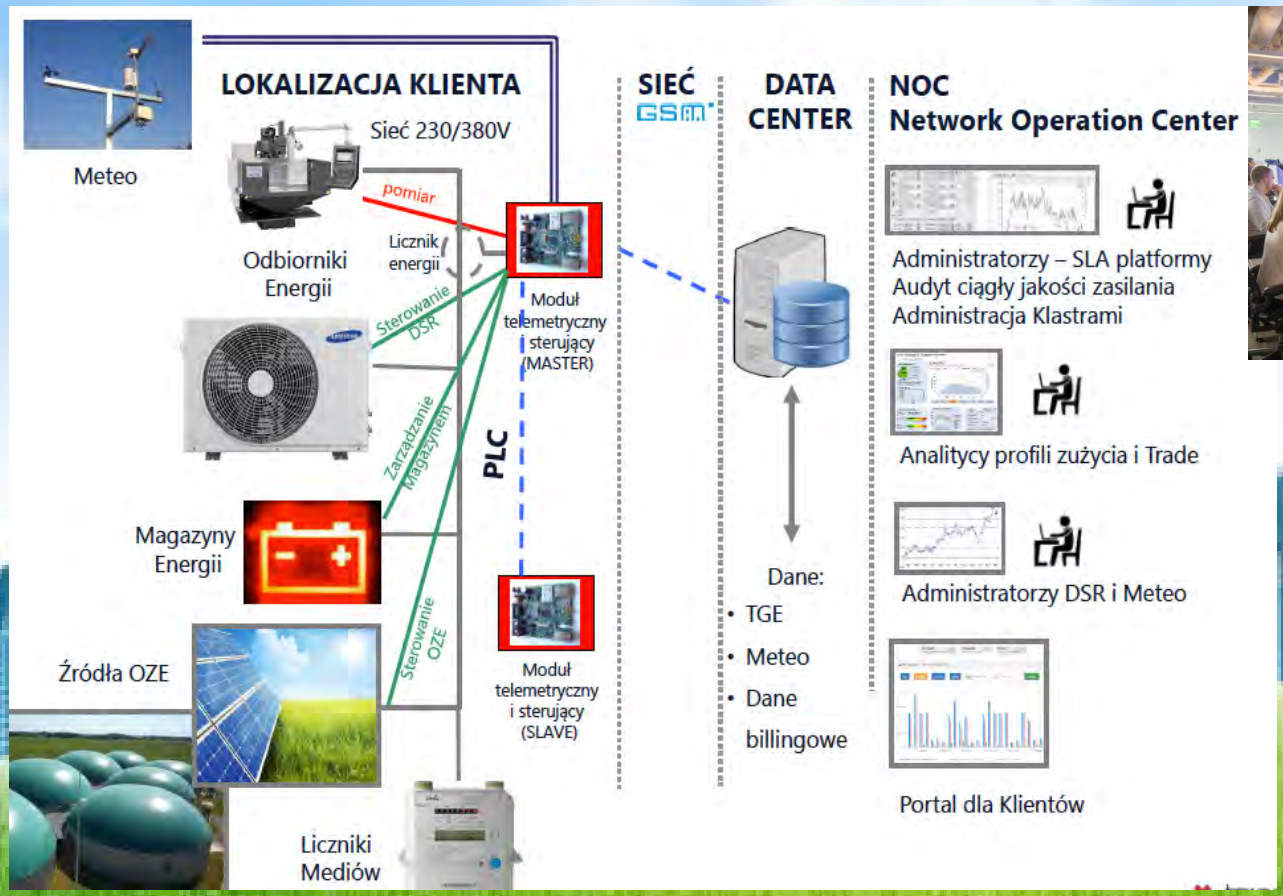
CLEAN CITY AIR - SOLUTIONS

SMART GIRD SOLUTIONS



CLEAN CITY AIR - SOLUTIONS

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SMOGATHON

CITY TREE BASED ON SPECIAL MOSS

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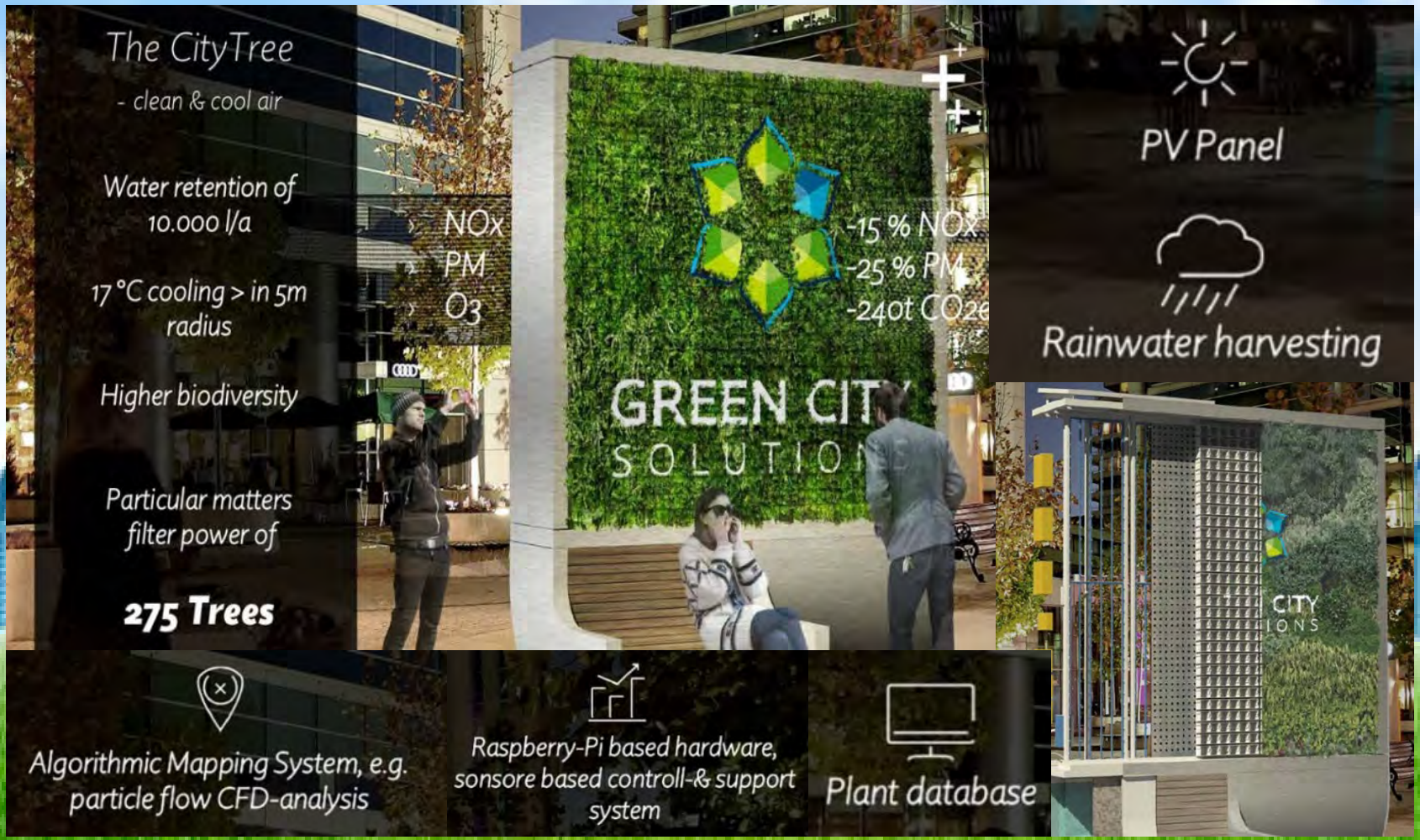
CLEAN CITY AIR - SOLUTIONS

CITY TREE BASED ON SPECIAL MOSS



WHAT IS A SMART CITY ?

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A DESCRIPTION OF THE EXPECTATIONS OF THE SMART CITY RESIDENTS

People want to live here, combine with the city of their future, get marriage, Have a kids, build a career path, develop own business or get a good job, develop their passions and interests and have opportunity to meet new friends

The city should ensure a high level of education, cultural and recreational activities, residential and office space, appropriate solutions in the field of transport and communications incl. public transport (buses and trains) and the own airports, safety solutions – city monitoring, large green areas and solution for well being development like bike and jogging roads, modern facilities for electrical vehicles, city's applications that make life easier in etc…

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WHAT IS A SMART CITY ?

SMART BUILDING CENTER

DEFINITION FROM CIIZEN's PERSPECTIVE

- **SEE** here **THEIR FUTURE** - thanks to City offer

- Can **BE** here more **HEALTHY** and **PRODUCTIVITY** – thanks to City activity :

GREEN ENERGY,

CLEAN AIR,

SMART SOLUTIONS

TRAFFIC SOLUTIONS

SMART
BUILDING
CENTER
90% of the time
we spend indoors !
the greatest impact on our health will have indoor air quality
means buildings
and their new role and responsibility
SMART BUILDINGS !
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WHAT IS A SMART BUILDING ?

SMART BUILDING CENTER

FOR THE RESIDENTS

- finishing materials and furniture free of VOC and polyurethanes
- continuous measurement of CO2 regulating the amount of supplied fresh air
- nano air cleaning filters purifying fresh air entering from outside the building
- proper acoustics and ergonomic workplaces
- proper lighting of workplaces with very high use of natural light
- co-working and co-creating zones in the system of next office
- applications that allow people to better communicate with the building and the people among themselves in order to build better relationships
- inner solutions that promote healthy and active lifestyles (changing rooms)
- biofilic solution allows the people in the building to closer to nature
- information educate residents as building affects on the environment

People are more ….HELTHY and PRODUCTIVITY

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WHAT IS A SMART BUILDING ?

SMART BUILDING CENTER

FROM THE CITY's PERSPECTIVE

- nano air cleaning filters purifying fresh air entering from outside the building
- solutions with a direct impact on the reduction of the traffic in the city
  - ❑ special parking places for car pooling
  - ❑ special changing rooms for people running and passing bikes to work
- BMS - building management system allowing the communication with other buildings exchanging not only information but for ex.: electrical energy
- charging stations and preferential parking spaces for electric cars

CITY has better air quality, lower traffic, lower general energy consumption and more HELTHY and PRODUCTIVITY citizens !

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WHAT IS A SMART BUILDING ?

SMART BUILDING CENTER

FROM THE ENVIROMENT's PERSPECTIVE

- limited impact of the building for emission of CO2
- production of heat and cold by special heating and cooling systems : ground heat pumping system, air pumping system etc.
- production of electrical green energy systems : solar panels, solar walls etc.
- ecological materials used for construction and finishing of the building
- the local vegetation and water-saving systems incl."grey water"

ENVIROMENT is saved for the next generation !

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WHAT IS A SMART BUILDING ?

SMART BUILDING CENTER

FROM THE ECONOMY's PERSPECTIVE

- cost savings in the consumption of electrical energy
- cost savings in the consumption of heating and cooling
- cost savings in water and wastewater consumption
- significant savings in staff sickness absence !
- staff more productive and satisfied with their job !

COMPANY PROFITS ARE HIGER THANKS TO LOWER COSTS

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WHAT IS A SMART BUILDING ?

SMART BUILDING CENTER

FROM THE EMPLOYER's PERSPECTIVE

- Employer builds a powerful image among workers and the labor market

AON

BESTEMPLOYERS

$$ 4% pts

Drive 4% pts more incremental operating profit

6% pts

Achieve 6% pts more incremental sales growth

33%

Have 33% lower staff turnover levels

33%

Have 33% more internal promotions

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SMART BUILDING - STUDY CASE

SMART BUILDING CENTER

POZNAN - POLAND / OFFICE BUILDING + PRODUCTION HALL

NETZERO ENERGY BUILDING CERTIFICATION℠

U.S. GREEN BUILDING COUNCIL
LEED PLATINUM
USGBC

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SMART BUILDING AS A HEART OF THE SMART CITY

presented by DARIUSZ STASIK

THANK YOU

დიდი მადლობა

dariusz_stasik@wpip.pl

www.wpip.pl

Mobile : +48 602 303 970

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