C40 CITIES
CLIMATE LEADERSHIP GROUP

BENEFITS OF URBAN CLIMATE ACTION

C40 Cities Technical Assistance Report

DURBAN

CLIMATE, AIR QUALITY AND HEALTH

C40 and Johnson & Johnson are working in partnership to connect the dots between climate action, improved air quality in cities and better health amongst citizens.

C40 has undertaken cutting-edge research, working with 26 cities to date to measure the air quality and health benefits of climate action, and use this to make a stronger case for action.

The time for urgent climate action

Cities are responsible for about 70% of global CO_2 emissions and play a leading role in global temperature increase to 1.5°C, in line with the Paris Agreement. Simultaneously, cities need to take adaptation measures to protect themselves against current and future extreme weather events, such as extreme cold and hot weather, floods and droughts. Finally, cities need to attend local issues of air pollution, including pollutants and toxic compounds.

In order to tackle both air quality and climate change, cities need clean and efficient transport, buildings and industry solutions.

DURBAN

Durban is the third most populous city in South Africa, with a population of over 3.5 million people. Its metropolitan area extends for 2,555 km² and represents the largest city of the KwaZulu-Natal region.

Durban has a large industry sector, which is responsible for 70% of the total Scope 2 greenhouse gas (GHG) emissions in the city[1].

70% OF THE CITY'S GHG EMISSIONS COME FROM THE INDUSTRY SECTOR

THE NEED TO TACKLE AIR QUALITY

In recent years, air pollution has become a serious problem in Durban. According to the World Health Organization (WHO), the annual average concentration of $PM_{2.5}$ should not exceed 10 µg/m³. In Durban, the annual mean is around 15 µg/m³, which is above the recommended limit.

Air pollution levels are particularly harmful in the industrial areas, and especially the South Durban Basin, where the $PM_{2.5}$ annual mean concentration can reach 29 µg/m³ (almost three times as high as the WHO threshold).

$PM_{2.5}$ CONCENTRATION IS 1.5 TO 3 TIMES GREATER THAN THE WHO RECOMMENDED VALUE

THE HEALTH BURDEN

Pollutants such as $PM_{2.5}$ and NO_2 represent a major risk to people's health, particularly affecting children and older people. $PM_{2.5}$ can penetrate deep into the lungs and it is linked to respiratory and cardiovascular diseases and deaths, even at low concentrations. Long-term exposure to NO_2 also causes inflammation of the airways and respiratory diseases.

In Durban, almost 2,500 premature deaths every year are attributable to the current $PM_{2.5}$ levels.

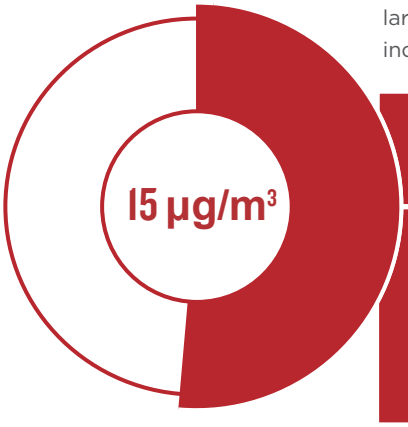
2,500 PREMATURE DEATHS EACH YEAR IN DURBAN ARE DUE TO $PM_{2.5}$ LEVELS.

Understanding the problem

Industry is an important sector in Durban's economy but it is also one of the most polluting. The industry sector in Durban is responsible for 53% of the total $PM_{2.5}$ concentration and 6% of the NO_x concentration in the city.

The South Durban area alone contains over 120 industries, plus, Durban has the largest concentration of petrochemical industries in South Africa.

The population within the South Durban industrial area (about 22,000 households) is subject to critical air pollution levels. Health impacts from poor air quality, such as asthma and other respiratory illnesses, have been a key issue in these industrial areas.



DURBAN INDUSTRY SECTOR

53% OF THE TOTAL $PM_{2.5}$ CONCENTRATIONS COMES FROM THE INDUSTRY SECTOR

120 INDUSTRIES IN SOUTH DURBAN

22,000 HOUSEHOLDS IN SOUTH DURBAN INDUSTRIAL AREA

The action

The National Environmental Management Air Quality Act (NEMAQA) requires municipalities to regulate listed activities through Atmospheric Emission Licences and by implementing an Air Quality Management Plan (AQMP). In addition, the city has developed the Durban Climate Change Strategy (DCCS), with one of the key themes in climate change adaptation and mitigation being health and energy efficiency. These set of acts, regulations, strategies and plans need to work in synergy to yield effective and efficient results. The NEMAQA requires that smaller industries comply with PM and SO_2 emission standards as of 2018, and that large industries comply with PM, SO_2 and NOx emission standards (which are on average half the allowed emissions of the standards promulgated in 2010). The AQMP also identifies hotspots of pollutants in certain areas, where particular care needs to be taken to regulate air quality. These include the NO_2 hotspot in the South Durban basin, SO_2, PM_{10}, and $PM_{2.5}$ hotspot in uMkomaas and PM_{10} hotspot in Hambanathi.

DURBAN AIR QUALITY MANAGEMENT PLAN

POLLUTANT EMISSION REPORTING

EFFICIENCY TARGETS

50% REDUCTION OF $PM_{2.5}$ EMISSIONS

30% REDUCTION OF NO_x EMISSIONS

The benefits

With support from C40, the city analysed the social and economic impacts of setting emission standards in the industrial areas of South Durban Basin. The results showed this would have a massive improvement on air quality, which would in turn improve the population's health and produce considerable economic benefits.

Air quality improvements, in terms of reduced concentrations of $PM_{2.5}$ and NOx, are observed in the whole city area.

The air quality improvement leads to a reduction in the health burden of cardiovascular- and respiratory-related diseases and deaths. Hospital admissions are used as an indicator for morbidity (diseases), while the change in premature deaths, life expectancy and life years gained are used to quantify mortality impacts.

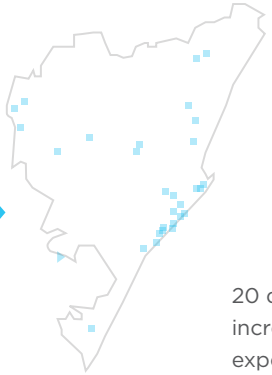
The economic impact represents the monetary value of averting a hospital admission and of gaining an extra year of life.

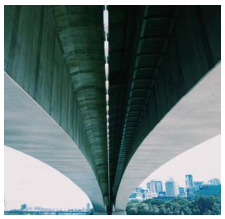
5.2% $PM_{2.5}$ REDUCTION IN THE WHOLE CITY AREA

26% $PM_{2.5}$ REDUCTION IN INTERVENTION AREAS

0.2% NO_x REDUCTION IN THE WHOLE CITY AREA

1.8% NO_x REDUCTION IN INTERVENTION AREAS





AIR QUALITY

150 PREMATURE DEATHS AVERTED PER YEAR

+2,860 LIFE YEARS GAINED FOR THE WHOLE POPULATION

HEALTH

+20 DAYS IN LIFE EXPECTANCY PER CITIZEN

20 day increase in life expectancy for each citizen. For those living in the intervention area, this increases to 110 days.

130 AVERTED HOSPITAL ADMISSIONS PER YEAR

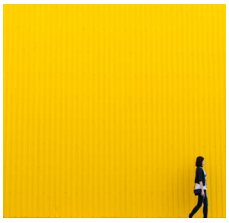
130 averted hospital admissions per year, including 100 for respiratory diseases, and 30 for cardiovascular diseases.

The value of averted hospital admissions is R 2.0 million South Africa Rands for respiratory and R 559,000 for cardiovascular diseases.

R299 M TOTAL VALUE OF AVERTED DEATHS

R2.59 M AVOIDED HEALTHCARE COSTS

ECONOMICS



DRIVING ACTION

SUSTAINABLE DEVELOPMENT

Economic development is a priority in Durban's agenda. In some cases, the measures taken towards this objective conflicts with environmental action. This analysis aims to raise awareness of the issues of industrial emissions and air pollution, to make the case for the city's sustainable development.

RAISE AWARENESS

The results of this analysis will be shared with a number of stakeholders in order to raise awareness and access the necessary support. Specifically, the results will be presented at the Climate Change TTT, a quarterly meeting attended by municipal department heads, as well as shared with NGOs at stakeholder engagement forums.

INCREASE KNOWLEDGE

Accurate air quality data is instrumental in making the case for action to policy makers. The Climate Action Plan has been developed and actions have been set to build capacity within the city on compliance monitoring an enforcement, in order to develop better informed policies. The action plan also aims to improve the quality of emission inventories to better prioritise where actions need to be taken.

NEXT STEPS

The city will have to ensure that industries comply with the new plant standards. This will require some industries to install abatement equipment to reduce emissions, and to switch to cleaner and greener fuels. The Air Emissions Licences (AEL), compliance monitoring capacity and skills in the city are to be significantly improved to ensure the effective implementation of these actions.

The city will incorporate the study results into the Air Quality Management Plan, within the Integrated Development Plan, to bring attention to the benefits of climate action in the industrial sector.

To raise awareness on a wider level, Durban will also present the results and make a case for climate and air quality action also at provincial and national levels. Potential events include the Provincial Air Quality Officers forum in Q1 2019 and the annual Air Quality Governance Lekgotla in October 2019.

Next steps also include looking to reduce pollutant and GHG emissions in different sectors. In particular, some areas in the city, such as Warwick and City Hall, are characterised by high levels of $PM_{2.5}$ and NO_2 due to traffic emissions. This analysis tool can be used to drive action on cleaner transport, for instance through introducing low emission zones in the city.

METHOD AND ASSUMPTIONS

Methodology available here.

Key assumptions:

- *The city average and background concentrations were derived from measurements at the stations of Wentworth, City Hall, New Germany, Cato Ridge and Hambanathi.*
- *Health impact estimates are based on $PM_{2.5}$ only, as NOx impact, with the available data, is estimated to be limited.*
- *Population and health data at national level were used, assuming that their distribution was representative for Durban.*
- *Proxy data from London used for VOLY and VHA and converted from 2017 USD using the relevant PPP exchange rate.*
- *Burden of air pollution on mortality was calculated by using the relative risk from published studies relating air pollution concentrations to health outcomes. This was applied to the difference between city-wide annual average $PM_{2.5}$ concentration and the GBD's theoretical minimum exposure (5.8 $\mu g/m^3$), and to the mortality rate in the local population. This is assuming impacts only in adults (ages 30+).*

The analysis has been carried out following the methodology outlined in the BUCA Guidance Manual.

Next steps:

Future data collection activities based on the data gaps in the analysis include:

- *Improve on air quality data monitoring and stations' maintenance, to ensure good quality of collected data*
- *Collecting data on Durban's mortality rates and hospital admissions*
- *Carry out health economics studies to determine local values of VOLY and VHA*
- *Plan source apportionment geographically to priorities focus actions*

Notes *[1] Durban City Source*

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