Key stage 3

Clean Air Schools

Student workbook

OURGREENCITY
SOUTHAMPTON

SOUTHAMPTON
CITY COUNCIL

Lesson 1

Where does outdoor air pollution come from?

Mobile sources:

Stationary sources:

Area sources:

Natural sources:

What are the effects of pollution?

What types of pollution are there at school?

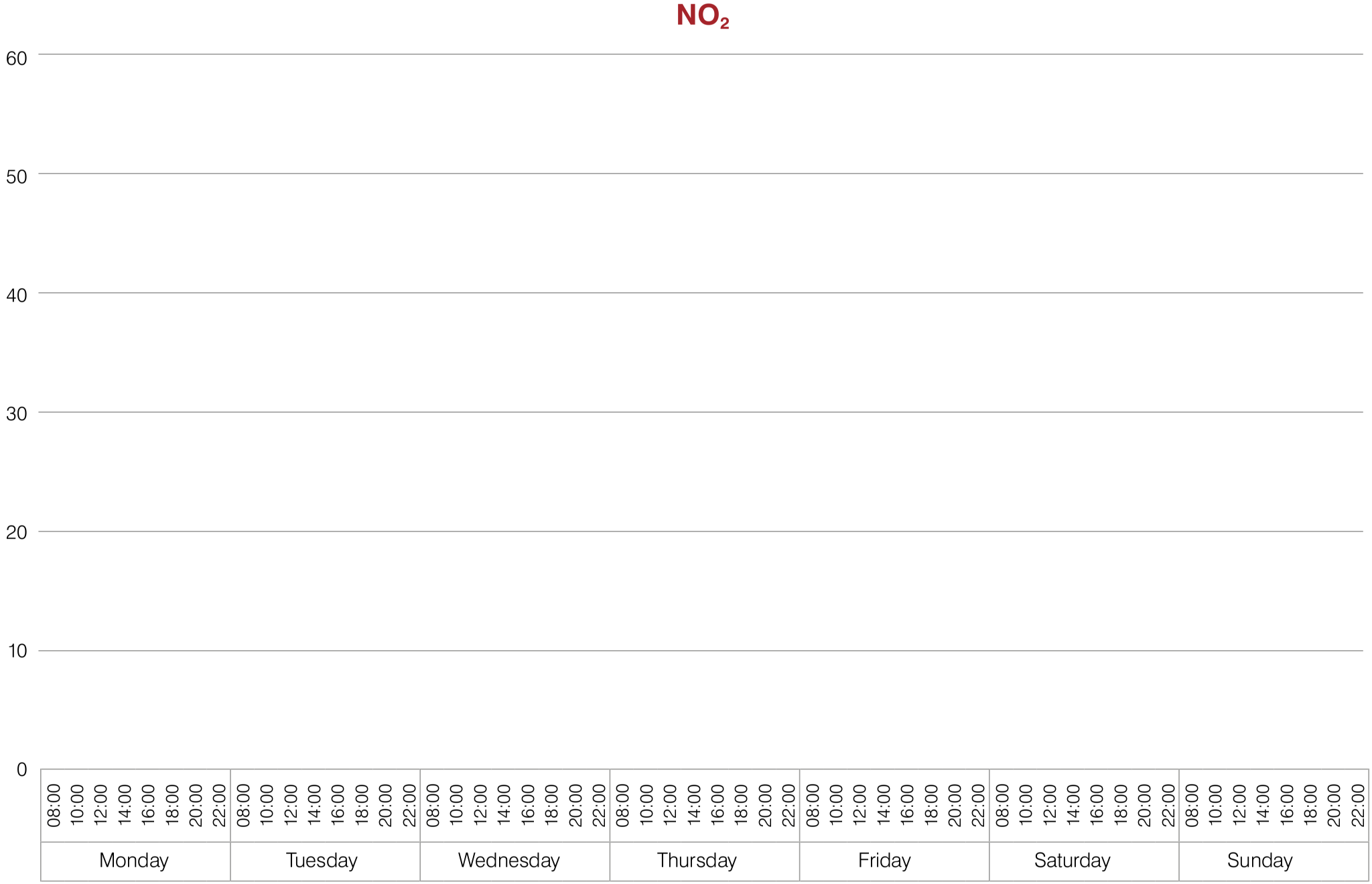
How can you help the school improve air quality?

How can the air quality be improved in Southampton?

Plot the points and connect the dots to create a line graph with annotation and labels to display the data

NO_2 µg/m^3	Monday	Tuesday	Wednesday	Thursday
08:00 am	38	30	35	30
10:00 am	20	10	25	27
12:00 pm	25	13	22	24
14:00 pm	27	18	25	25
16:00 pm	39	26	30	49
18:00 pm	53	38	26	46
20:00 pm	33	25	25	30
22:00 pm	20	22	24	25

NO_2 µg/m^3	Friday	Saturday	Sunday
08:00 am	43		
10:00 am	31		
12:00 pm	28		
14:00 pm	27		
16:00 pm	35		
18:00 pm	34		
20:00 pm	30		
22:00 pm	29		


NO_2
60
50
40
30
20
10
0
08:00 10:00 12:00 14:00 16:00 18:00 20:00 22:00
Monday
Tuesday
Wednesday
Thursday
Friday
Saturday
Sunday

Lichen

What is lichen?

Lichens are plants and they will grow on rocks, trees and roofs, where other organisms cannot. Lichens are very sensitive to air pollution and are good indicators of air quality. They are sometimes used to monitor the effects of pollution in towns, cities and around industrial development sites, this makes them a good indicator species for pollution.

Types of lichen

Lichen can show us how polluted the air around us is. There are lots of different types of lichen – they come in all sorts of shapes, sizes, and colours – and different types of lichen like different types of air!

- Nitrogen (NO_2)-sensitive lichens only live in clean air
- Nitrogen(NO_2)-loving lichens can live in dirty air
- Some lichens are not affected by air quality and can live anywhere

Age of lichen and pollution

Lichens on the trunks of trees have often been there for a lot longer and lichen on young trees or twigs may support lichen that's grown in the recent years. Do trunks or twigs have more pollution-sensitive lichen?

Name of lichen	Colour of lichen	How much does it cover?	Location of trees with this lichen on?
The Pollution Gang : Nitrogen-loving			
 **Leafy Xanthoria**	**Orange / Red / Yellow**		
 **Cushion Xanthoria**			

Name of lichen	Colour of lichen	How much does it cover?	Location of trees with this lichen on?
The clean lichen: Nitrogen sensitive			
 **Unsea**	**Green / blue**		
 **Evernia**			
 **Hypogymnia**	**Green / blue**		

Name of lichen	Colour of lichen	How much does it cover?	Location of trees with this lichen on?
The Grow-Anywhere Gang			
 **Melanelixia**	**Grey / light green**		
 **Flavoparmelia**			
 **Parmelia**	**Grey / light green**		

Map of survey area

Draw, annotate and make a key for a map showing the locations of the trees surveyed and what lichen they had.

Observations and analysis

Which type of lichen did you see the most?

☐ **Green** ☐ **Grey** ☐ **Orange**

Was there more nitrogen sensitive lichen (orange) on trunks or twigs of trees?

☐ **Trunks** of trees ☐ **Twigs** of trees

Where the trees with more nitrogen loving lichen closer or further away from the road?

☐ **Closest** to the road ☐ **Away** from the road

What does this say about the air near the school and about when pollution has been worse?

What do you think is causing the air to be polluted near the school?

Word search

Circle the words you can find from the list below.

p d n k k r a l s y t l q l t p w b d n c j f j p
z a u o e l h l r z k k x m b p f y c i w v u a p
f g r s i d l i n g l r g v b s d e f y g w m h a
c d e t t s v a d g e w r q t y h f c n c m e l p
n h a r i t u i c v o i u h y k a b v f s l s j c
f g e r v c o f h l m u i b g r l u n g s s i r t
f l e r v x u b f s r e w j t h k l p o u b s n n
r s w e i x y l m i p y z b d r e n b e w n k j g
b g h d y u i d a f d s e v g h y a t x o b n f j
f r e e v s g j t t i o p x v k s l l i i r u a o
b r e f t h d s a e e y u b n j i m s t d n t l p
g h o t y g v s r v b s m n u t y s o l h i u i q
w a j k i n g e g h d e t y b c i l m k n a b q i
t r f d i n h g p l f v z e w m q m v e e v e y j
d e a w c p d c f s h g b b e e y k l o p g t r e
e c x p s h j k r t y u b f s d a s c c e r v s t
l k h o p g h y a q w m n x z g l i z n b u i o j
l a m f r e w d g v h j u y n v x k n o i l f a q
l t p v q g a s f t e w v h g o j e h r u n y t b
a v g y d o p s d e f t m n t l g o i y t x z s a
b g h d y u i d a f d s e v g o y a t x o v n f j
p d n k k r a l s y t l q l r p w b d n c j f j p
n h a r i t u i c v o i u t y k a b v f s l s j c
r s w e i x y l m i p y i b d r e n b e w n k j g
d w a l k i n g g t h n e w v p s y b n g d f y i

Words to find:

Atmosphere
Cycling
Diffusion
Dioxide
Dust
Emissions
Fumes
Gas
Health
Idling
Lungs
Nitrogen
Particulates
Pollution
Run
School
Smoke
Toxic
Traffic
Tube
Walking

Produced by Amber Titchener
Sustainable Schools Engagement Officer

https://soton.cc/schoolscleanair