

# The Air We Breathe



# Acknowledgements

## Authors:

Isabel Getz (UCD EUSA), Sydney Evitts (UCD EUSA), Dr. Francesco Pilla (UCD), Santa Stibe (UCD)

## Special thanks to:

Amazing girls from the St. Brigid's Senior Girls' National School – your ideas are so inspiring!

Creative minds and great artists from the St Catherine's National School – your drawings are incredible!

Scientists and experts, especially, Dr Aonghus McNabola (TCD), Dr John Gallagher (TCD), Brian McManus (DCC), David Dodd (DCC), Kevin Delaney (EPA) – keep up the good work!

Great people behind the Science Apprentice initiative, especially, Alex Boyd, Áine Flood and Claire O'Connell – thank you so much for your priceless advice and inspiration!

Sincerely yours,  
iSCAPE's team in UCD

November, 2018  
Dublin, Ireland





# Introduction

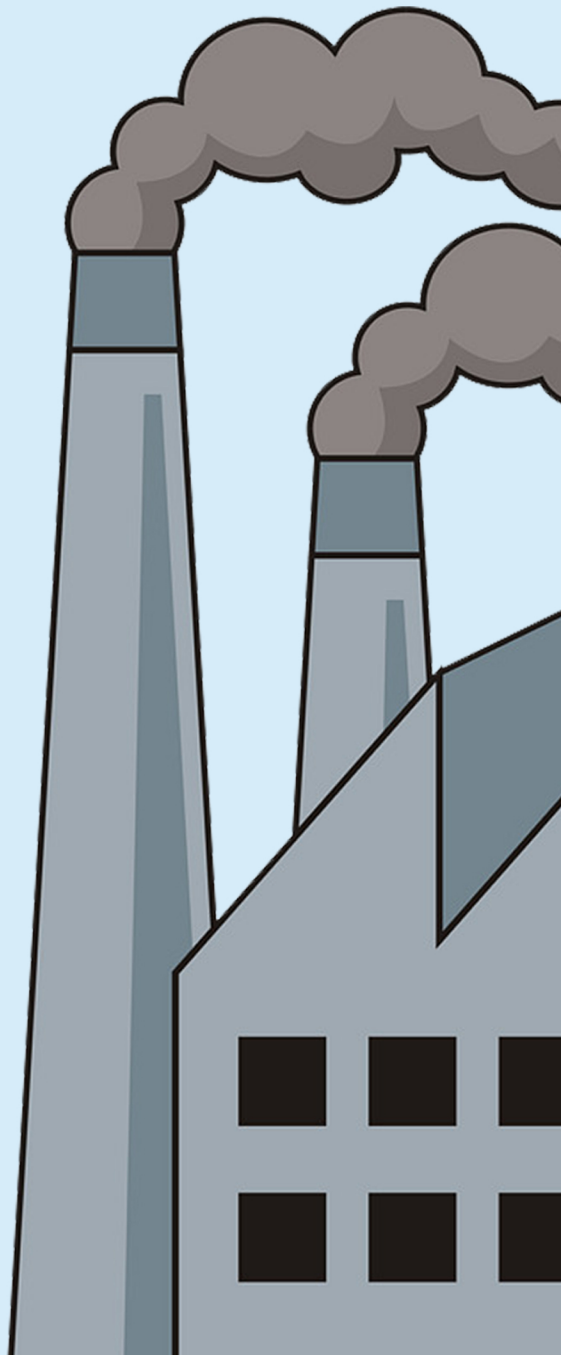
## **What is this book about?**

This book is the outcome of scientists and students working together to fight air pollution. Dr. Francesco Pilla is one of the scientists who is leading the way to improve air quality in Europe. Through his project called iSCAPE, Francesco is trying to fight back against air pollution and he needs your help! He has been visiting schools around Ireland to ask students to create solutions to this worldwide problem.

## **Did you know that you can help solve the problem of air pollution?**

Air pollution is a big threat to humans and the planet, and scientists in Dublin are working together with kids just like you to find solutions.

While you're reading this, try to think out of the box and come up with an invention or two that could protect people from air pollution.



# Meet Francesco!



“I love ice cream... but ice cream  
doesn't taste that good with  
some air pollution topping!”

**Dr Francesco Pilla, University College Dublin**



Before you hit the road to innovation, let's learn about what air pollution is and where it comes from! We have asked scientists and experts to share their views on air pollution which you will find throughout the book.



# Why Does Air Pollution Matter?

*"The quality of the air we breathe affects our everyday lives. Air quality changes depending on where and how we live - living in towns or cities where there is lots of traffic affects air quality in a different way to the air quality in a rural community that is more reliant on coal or turf for home heating. Poor air quality has an impact on our health; it's important that we make the right choices in our community, so we can have better air quality for our families and neighbours now and into the future."*

**Kevin Delaney, The Environmental Protection Agency**

Air pollution is the presence of harmful substances in the air that can hurt humans, animals, and the environment. We are all exposed to air pollution everyday during common activities such as playing sports outside or walking to school. Pollutants in the air can enter our bodies through our lungs, skin, and eyes, which can make us sick or affect our breathing. Air pollution is also a cause of climate change which can affect our time spent outside playing with friends.



Fortunately, we can all help reduce air pollution by learning about where it comes from and making positive changes that are better for both the environment and our health! In this book you will learn about the sources of air pollution. Then, we will guide you toward ideas that can improve the quality of the air around us.





# What Are Air Pollutants?

**Air pollution is usually invisible!**

Most air pollutants are gases or tiny particles that are too small to see. Air quality is a measure of how clean or dirty the air is. When a lot of pollutants are in the air, air quality is bad.



Air polluting gases include carbon dioxide, methane, and nitrogen oxides.

Some of these gases are known as “greenhouse gases,” because they trap heat in the atmosphere just like a greenhouse does. When this heating process happens in the atmosphere, it can cause climate change.

Another form of air pollution is particulate matter. This kind of pollution is made up of small solid or liquid particles that float in the air. These can hurt your heart and lungs.



# What Causes Air Pollution in Ireland?

*"In Ireland air pollution can come from many sources. Burning coal and other dirty fuel at home can cause smoke pollution. Different forms of transportation which includes cars, trucks, busses, trains, ships and aeroplanes produce loads of different air pollutants. Industry such as big factories and power plants also cause many types of different air pollutants. Farming and food processing can cause air pollution that smells awful."*

**Brian McManus, Dublin City Council**



# Source 1: Transportation

*“A lot of air pollution around the world comes from cars, buses, planes, ships, trains and other machines with engines that burn fuel. Burning fuel to make an engine move creates air pollution and since there are hundreds of thousands of engines around the world all burning fuel, this adds up to a lot of pollution in the atmosphere.”*

Dr Aonghus McNabola, Trinity College Dublin

Almost all forms of transportation release greenhouse gases. Cars, trains, boats, and airplanes all release pollutants into the atmosphere. In some cities you can see this pollution in the form of smog. Other times you can't see the pollution but that doesn't mean it's not there!



**TIP:** One way to reduce the amount of traffic pollutants entering the atmosphere is to walk or bike to places that are close to you. For example, if you live close to a friend's house or school you could ride your bike instead of driving. Buses, or other forms of public transportation, are also a way you can reduce the amount of pollutants in the atmosphere because it cuts down on the amount of cars on the road.



## Source 2: Humans and Households

*“A smoker directly breathes in the air pollutants that come from lighting a cigarette. The message is simple when it comes to smoking, don’t smoke!”*

Dr John Gallagher, Trinity College Dublin

Unfortunately, humans produce air pollution too, for example, when they choose to smoke. Smoking produces air pollution because cigarettes release smoke and chemicals that are harmful to both human health and the environment. Smoking not only impacts the lungs of the person who is smoking, but also pollutes the surrounding air. That means that even if you don’t smoke, you can still be exposed to the toxins if you are standing near someone who is smoking. Sometimes people who smoke just throw their used cigarettes on the ground instead of in the trash, which pollutes the ground. You don’t want to be playing in cigarette butts!

But humans are not the only ones who smoke, buildings “smoke” too. When you burn wood, coal, peat or other things in your fireplace, your house smokes through its chimney (the giant cigarette on the roof!) and sends small polluting particles up in the air.

**TIP:** Choosing not to smoke is a great way to improve the quality of the air around you and protect your health. Using an eco-stove rather than a standard stove or an open fire will also reduce pollution.



## Source 3: Industry and Farming

*"It is essential that we move away from using all fossil fuels to limit the damage we are causing to our health and the planet. Using fossil fuels like peat, turf, coal, gas and oil not only releases greenhouse gases that are warming the planet but also air pollutants like soot and toxic gases that are damaging our health on a daily basis. If we reduce our fossil fuel use we can provide cleaner air for people and the planet and make our towns and cities healthier places to live and work in."*

David Dodd, Dublin City Council

Factories and processing plants burn fossil fuels and release greenhouse gases into the atmosphere through smokestacks. Every factory is different and each one has smokestacks that release different gases and pollutants into the air. Landfills also make greenhouse gases when the garbage in them decomposes. Methane and carbon dioxide are the two main ones.

**TIP:** By recycling you can cut down on the amount of garbage put in a landfill each day.

Many of you may not know that the cows we raise create methane when they burp or fart. This may sound silly, but it adds up to a large amount of methane! Methane is a gas that traps a lot more heat than carbon dioxide does in the atmosphere.



**Now that you've learned about air pollution, let's check off the activities you could do to reduce air pollution!**

- ☐ Walk or bike to school instead of driving
- ☐ Take public transportation more often
- ☐ Choose not to smoke cigarettes
- ☐ Plant trees and hedges in your community
- ☐ Have your parents turn the car off while they're waiting outside of school to pick you up

**Add your own ideas here!**

---

---

---

---





Air pollution is a serious issue that impacts human and environmental health. However, we can work together to solve this problem and improve the quality of our air. By doing even one of these things you are making Dublin a safer and cleaner place to live and grow!



# The Road to Innovation

Learning about what air pollution is and where it comes from is the first step toward improving air quality. You can also have the power to help scientists to improve the air quality in your city.

When Francesco visited St. Brigid's Senior Girls' National School, the students designed solutions to air pollution. The students used legos to make their solutions come to life! They built low boundary walls, bubbles around factories, and air filters. These technologies can be used in real life to improve air quality and protect people from the harmful effects of air pollution. For example, one student came up with a machine that catches and filters cow farts to make the air clean again!

*"A child's mind is brilliant! It's full of great and creative ideas triggered by curiosity. These ideas can help scientists like me to think outside the box and find better ideas for improving the air we breathe. I have attended a number of schools in Dublin to play and learn together with a bunch of creative and talented minds. During these events we built new ideas together using lego bricks. It was so much fun!"*

**Dr Francesco Pilla, University College Dublin**



Got some cool ideas or inventions that could help scientists and experts to reduce air pollution in your city? Here's what you can do:

### Step 1: Build or draw your invention!

You can build your invention using all sorts of weird and wonderful materials. Look around! Is there anything you could recycle - paper, wood, plastic, fabric?

You have probably already noticed that there are so many weird and wonderful materials from around the house. Toilet paper rolls, empty cans, cardboard boxes, strews, or even pasta are some great building materials. You can also use lego bricks like the girls from the St. Brigid's Senior Girls' National School.

Now, it's time to build your invention. Use your imagination to dream, create and solve the problem of air pollution!

Don't feel like building? That's fine! You can also draw your idea. Drawing is a great way of visualizing your ideas too!



**“Make greenhouses,  
not greenhouse gases!”**

**- Peter, age 11**





## Step 2: Take a picture of your invention and share it with others!

To share your picture with Francesco and others, you might want to ask your parents or a teacher for help.

### What they can do:

They can post your picture on their Facebook or Twitter accounts, using hashtags **#TheAirWeBreathe**, **#DublinLivingLab** and **#iSCAPEproject**. These hashtags will help Francesco to find your picture on the internet. He will wait for your picture until **June 30, 2019**.

Get your parents or a teacher to include the name of your invention and a description of how your invention would solve air pollution in their post.

Your picture will also help the iSCAPE project scientists and air pollution experts to come up with new ideas for improving the air quality in your city.

**Together we can increase the public awareness of air pollution!**





### **Additional Sources:**

<https://www.iscapeproject.eu/>

<https://livinglabs.iscapeproject.eu/dublin/>



The iSCAPE project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement No. 689954.

