

The scourge of air pollution

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“When I was on that boat, there was nothing. Just the sound of the ocean and the waves crashing. But that was it. No smells. So the first thing I noticed when I came into the harbour was that, I woke up and suddenly it smells. And that was pollution.” Greta Thunberg’s description of her first encounter with New York City, having spent two weeks crossing the Atlantic in a yacht.¹

Encountering one of the world’s great cities having spent a fortnight in the extreme isolation of a zero-emissions racing boat in the North Atlantic, must rank as one of the more formidable assaults on the senses. It is also a juxtaposition most of us will never experience. Flying from city to city is hardly the same thing. Thunberg’s striking description, like much of what she says, should give us pause for thought. For most of us, breathing dirty air is unavoidable and something we are all too often oblivious to. Moreover, not all air pollutants smell and much of the time such pollution is effectively invisible. But it is still deadly. Despite significant improvements in air quality in the United States, since the passage of laws such as the

1970 US Clean Air Act, it is estimated that every year 100,000 Americans have their lives cut short due to air pollution.² Here, despite our island status, the refreshing influence of the Atlantic and despite legislation limiting the use of smoke producing fuels, polluted air is thought to kill about 1,200 Irish people every year.³ Worldwide, the figure is more like 5 million.⁴

In December of 1952, a combination of cold weather, windless conditions and airborne pollutants caused by the burning of coal, led to a four day period of intense smog in the city of London. London was no stranger to smog. The mix of soot, smoke and “pea-soup” fog was a

familiar occurrence. However the severity of this event was unprecedented, penetrating indoors and offering no respite. It was thought at the time to have directly killed about 4,000 people, although modern reanalysis puts that figure at about 12,000.⁵ Many people simply suffocated in their beds. Over the following weeks and months thousands more succumbed and those left with permanent respiratory tract damage numbered in the hundreds of thousands.

The ‘Great Smog of London’ led to an enormous public outcry. Initially, Winston Churchill’s government dragged its feet, denying any link between the deaths and pollution. Eventually, after immense public pressure, a Clean Air Act was passed in 1956. Domestic coal was to be replaced by ‘smokeless’ fuels such as coke, electricity and gas and a major clean-up of UK cities was to follow. Leaving aside for now that such smokeless fuels were produced by the burning of coal somewhere else, this (along with subsequent acts) did lead to a significant improvement in air quality in UK cities.

In recent decades, similar reductions in coal-based smog have taken place throughout most European cities and in the United States. Such improvements typically came only after strenuous public demand and often lengthy political debate. In Dublin for example, smog from domestic coal burning was a very serious problem until as late the mid 1990s, before 1990 legislation banning the use of bituminous (smoke producing) coal began to take effect. One barrier was the increased cost for people of heating a home with smokeless fuel, something which required state intervention such as financial aid in the form of a smoke free fuel allowance, to rectify. It is worth noting that this allowance was abolished in 2011 as a part of a raft of austerity measures.

Modern day air pollution, in the western world at least, no longer takes the form of the dense black smoke we might associate with Dickensian London. But that does not mean that dirty air, though less visible than in the past, is not still a serious problem in the so-called advanced nations. Meanwhile in China and India, the modern day “workshops of the world”, the problem of air pollution is front and centre. Though the wealthy have means to minimise their exposure, for the great majority life takes place amid a toxic haze.

Without food, a human might survive for three weeks. Without water, the limit is about three days. Without air, death will occur in minutes. Thus, air pollution scientist Dr. Gary Fuller points out in his book, *The Invisible Killer*, it is astonishing how little attention many of us pay to the quality of our air, in comparison to what we eat or drink. Consider the outcry if 1,200 Irish people were dying yearly from toxic impurities in our food. According to the World Health Organisation (WHO), over 90% of people worldwide live in areas which fall short of their recommended standard for clean air. More than half live in places which fall below even the most minimal standard. So what form does this pollution take? There are of course a multitude of substances of all manner of shapes and sizes which pollute our air. Some are naturally occurring. Most result from human activity. Roughly, these can be divided into two groups: *particulate matter* and what for the purpose of this article we will call *chemical* pollution.

Particulate Matter (PM) This is made up of all manner of stuff including soot from industry and power plants, dust from construction sites, road building and brick production, airborne sand and sea-salt, particles of rubber and metal from worn tires or break pads, airborne debris from forest fires, burning landfill or scorched agricultural fields. Within this collection, scientists denote by PM₁₀: airborne particles with a diameter of less than 10 microns, and by PM_{2.5}: the subset of those particles with diameter less than 2.5 microns. To give an idea what this means, a particle of fine beach sand is about 90 to 100 microns in diameter while the diameter of a human hair is approximately 50 to 70 microns. So PM_{2.5} particles are very small. This actually makes them more dangerous. Some of these particles, such as Black Carbon (found in soot), are well known

to damage human health. In particular its minute size means that once inhaled such a particle can access all parts of the human body, including the fetal side of the human placenta! ⁶ The general problem of understanding and classifying which among the plethora of particles labeled PM_{2.5} is harmful is an ongoing and challenging research problem. What is certain however is that when levels of PM_{2.5} increase in a region, so do levels of cardiovascular and respiratory disease and all the suffering this entails.

In 1987, the WHO established Air Quality Guidelines in an attempt to determine safe and varying unsafe levels of PM_{2.5}. These guidelines (which are continually updated) deem that anything beyond an average of 10 micrograms of PM_{2.5} per cubic metre of air is unsafe. As with most of these sorts of guidelines such a cut-off is somewhat arbitrary and many scientists argue that there is no such thing as a safe level of PM_{2.5}, just varying degrees of harm. In 2017, about 92% of the world’s population lived in areas which exceeded the 10 micrograms guideline.⁷ Over 50% lived in areas which exceeded average PM_{2.5} counts of over 35 micrograms per cubic metre. In South Asia for example, exposure to levels of PM_{2.5} in the 100s of micrograms is common. According to one WHO report, one day of breathing the air in Dehli was the equivalent of smoking 45 cigarettes!⁸ What is more, these figures do not take into account indoor particulate matter caused by burning of wood, coal and other fuels for cooking and heating. This is an especially serious problem in the developing world. In many African countries, the burning of biomass for fuel leads to PM_{2.5} levels of between 200 and 300 within the family home.⁹

Chemical Pollutants. Along with the amorphous collection of relatively larger pieces of matter that fall under the PM category, there are various gaseous pollutants. The most abundant of these are Sulphur Dioxide (SO₂), Carbon Monoxide (CO), Nitrogen Dioxide (NO₂) and Ozone (O₃). The pungent suffocating smell of SO₂ is indicative of its caustic effect and the damage inhalation can cause to the human respiratory system. As well as an emittance from coal burning power plants, it is a common byproduct of industrial processes. It is particularly reactive with other compounds which can lead to the formation of sulphuric acid and most

notoriously acid rain.

The asphyxiating properties of the odourless and colourless CO are a well known and deadly consequence of burning a fuel too rapidly or with insufficient oxygen. This happens in an internal combustion engine and is why many countries now require cars be fitted with catalytic convertors, designed to reduce these emissions. This has led to some improvement, although the construction of catalytic convertors (requiring the mining of certain precious metals) and the temperature required for effective operation (leading to increased Carbon Dioxide (CO₂) emissions) is a serious downside.¹⁰ A major source of CO is also unflued gas and wood burning heaters. Though less of a problem in the developed world, for people in living in cramped, poorly ventilated conditions (and without detection technology) CO is an ever present danger.

Another common motor vehicle emittance, particularly from diesel engines, is NO₂. Its damaging effects on human respiratory health and on the immune system are well documented; NO₂ profoundly exacerbates conditions such as asthma as well increasing the risk of flus and bronchitis. In 2017, NO₂ was in the news when it was demonstrated by US prosecutors that between 2009 and 2015, the Volkswagen Group had deliberately added devices to over 11 million of its cars to cheat an emissions test. Essentially, these “defeat devices” activated emission controls only during regulatory testing, allowing emissions of up to 40 times more NO₂ during regular driving. After initial denials and claims that the discrepancies were mere technical glitches, pressure from the US Environmental Protection Agency (EPA) eventually led to a complete admission of responsibility. The scandal was not, as Volkswagen had at one stage maintained “the work of a few software engineers” but went right to the top of the organisation. The company, faced with the problem of creating a diesel engine which would perform well and also meet standards of an emissions test, was quite prepared to simply cheat.

We now know that Volkswagen were not alone and that such practices were common across the automobile industry. From the mid 2000’s diesel cars were promoted as a more ecologically sound alternative to the petrol engine. In Ireland in 2008, the then Fianna Fail-Green Party government changed the Vehicle Registration Tax (VRT) from one based on engine capacity to one based

on CO₂ emissions. This favoured diesel engines, which produced lower CO₂ emissions than their petrol based counterparts. Similar efforts promoted diesel across Europe. While it is true that modern diesel engines emit less CO₂ than their petrol based counterparts, the emissions in NO₂ and PM_{2.5}, despite the claims once made by the industry, are significantly worse. Apart from highlighting the hardly surprising fact that a major corporation would be prepared to lie so brazenly (and in turn inflict unquantifiable environmental and human harm), this episode teaches us one other thing. That is the importance of regulatory bodies like the Environmental Protection Agency. It is no wonder that so many on the Republican right in the US, including Donald Trump, want to see it abolished.

While Ozone in the stratosphere plays a vital role in shielding us from harmful solar radiation, at ground level its powerful oxidising properties mean that it is especially damaging to living tissue, increasing in particular a person’s likelihood of dying from Chronic Obstructive Pulmonary Disease (COPD). As well as its deleterious effects on human health, ground-level (tropospheric) ozone negatively effects vegetation and crop productivity. Ozone in this context is an example of a secondary pollutant, in that it arises as a result of the interaction of NO₂ with certain ‘volatile organic compounds’ such as methane and ammonia. The reaction takes place in the presence of heat and sunlight; thus the problem is exacerbated by warmer climate. This kind of insidious secondary effect shows in stark terms the complexity of the ‘Earth System’ and the ease by which deadly unintended consequences can arise.

Interestingly, while lower levels of PM_{2.5} typically correspond to higher economic development (i.e. developing nations have a bigger problem with PM_{2.5} than the more advanced ones), in the case of ground-level ozone, the correspondence is not quite as clear. For example, despite improved legislation, ground ozone pollution is still a significant problem in the United States and Europe. Indeed, it is frequently visible as the familiar photochemical smogs which plague cities like Los Angeles and Paris. It is worth pointing out, given Ireland’s large farming sector, that the main source of the ammonia and methane components in the ozone forming reaction is manure and synthetic fertiliser from agriculture. These emissions are damaging in their own



right, both as green-house gasses and for the direct damage they can do to the biosphere through eutrophication (adding excessive nutrients and thus destabilising an ecosystem). In Paris in the Spring of 2014, the combined effect of ammonia from nearby agriculture with vehicular NO₂ was sufficiently bad to see half of the road traffic banned in an emergency measure to curb smog.¹¹

A common refrain among liberal environmentalists is that we are all in this together. According to Al Gore, speaking on climate change, “We all live on the same planet. We all face the same dangers and opportunities. We share the same responsibility for charting our course into the future”.¹² Given the scale of a problem like air pollution, such a sentiment might seem reasonable. But it is profoundly mistaken in at least two ways. For one, there are clearly enormous inequalities in the way different people experience air pollution. Secondly, the suggestion that the responsibility is shared equally is not only absurd, it compounds the problem by minimising the role of the powerful entities most to blame.

The quality of the air we breathe is a strong indicator not just of our geographical location, but of our social and economic place in the world. The air breathed by the owner of the mine is very different from the air breathed by the person who digs the coal. Within any city, it is the less well off who must live by the main concentrations of traffic and industrial pollution. A recent report in the *Lancet*, based on a study of 2,000 London school children, suggests that growing up in a high

traffic area has the effect of stunting the growth of children’s lungs.¹³ Such patterns are undoubtedly repeated in cities throughout the world, where filthy air is among the myriad evils faced by those in poverty.

On a global scale these divisions become all the more stark. In the 19th century, Manchester was known as the “chimney stack of the world”. Today, those dark satanic mills blot the skies of China and India. Much of what is produced under often inhumane conditions is for consumption in the West, something critics of Chinese and Indian environmental practices should remember. What is more, it is common practice for Western nations to ship rubbish for disposal in the developing world. One horrifying example, described by George Monbiot, is the practice of sending used tyres to countries like India. These are then baked in pyrolysis plants to make a particularly dirty industrial fuel inducing a terrifying mix of airborne toxins.¹⁴

For many in the developing world, the effects of air-pollution are the stuff of nightmares. In cities like Shijiazhuang, about 300 kilometres south of Beijing, the Spring-time sunrise is barely visible through the thick haze of industrial emissions. PM_{2.5} levels average around 200 micrograms, about 20 times the WHO safety threshold.¹⁵ Face masks are ubiquitous. On some days, the air makes people prisoners in their homes. Those who work outdoors, such as street vendors, must endure bizarre cocktails of black soot from coal power plants and white dust from nearby cement factories. Diseases like COPD are all too familiar here. While high

rates of smoking certainly contribute, a recent major epidemiological study published in the *Lancet* suggests that poor air quality is a significant factor.¹⁶

Beth Gardiner, in her book *Choked* traveled to Delhi where emissions from motor vehicles, coal burning power plants and agricultural 'stubble' burning in the surrounding countryside, enshroud the city in a filthy haze. Gardiner describes a family living on a highway median, surrounded by lanes of traffic on all sides and with an overpass above. As the children cough and wheeze amidst the relentless traffic, their father asks: "Where should we go?" While the better off can afford to live away from the worst air and obtain some protection through artificial filtration and purifiers, the poor are left utterly exposed with no means of escape.

It can be hard not to feel despondent at the image of a family huddled together amid the maelstrom of toxin spewing metal. It is important to remember however that those struggling to breath clean air are the many not the few. And though some argue that such egregious levels of pollution are the necessary price of development, protests and popular demands for reform are gaining ground all over the world. In the developing world, these are often met with severe state repression. In 2018, in Thoothukudi, Southern India, local residents protested against the British owned Sterlite Copper smelter whose effluents were polluting local air and water. In May of that year at least eleven people were killed when police opened fire on the crowd.¹⁷ Despite this, the protestors persisted and the plant has not been allowed to reopen.

The struggle against air pollution is one aspect of a movement against environmental destruction which is growing all around us. At a minimum, any such movement must call on governments to take certain immediate steps:

- Establishing free and efficient public transport and the implementation of town planning which reduces the need for private cars and trucks. One example of this concerns waste collection. In Ireland, the privatisation of waste collection has led to the ridiculous situation whereby the same street may be visited by a different private collection truck on four or five different week days!
- A comprehensive state funded program to retrofit and homes and buildings for energy efficiency. In

Ireland this is a serious problem, especially given that in many small towns, the burning of coal and peat is still used in home heating.

- Rapidly transitioning to cleaner energy sources such as wind, wave, geothermal and solar power. Such a transition must ensure that the needs of workers within existing fossil fuel based industries are protected and that adequate retraining and reemployment is provided.

- Protecting and extending existing air quality legislation and empowering Environmental Protection Agencies to enforce regulations.

Such steps would mean taking a stand against the immensely powerful fossil fuel industry, the automobile industry and in fact any institution which benefits from lax air quality legislation. It would almost certainly require challenging corporate tax evasion and ensuring that the rich pay their share. To succeed, such a struggle would need to mobilise large numbers of people and would force us to reevaluate very seriously the structure and priorities of our society. Why is it that obtaining such modest and sensible reform is such a struggle? Is it possible to achieve such reform under the present configuration of society?

The inequalities in the air we breathe reflect the deeper inequalities in the capitalist system. The fact that so much of our air is filthy is to a large extent due to the fact that capitalism is unalterably wedded to the burning of fossil fuels. Most environmentalists accept both of these points but argue for a reconfiguration of capitalism to an ecologically responsible and more socially just form. The technology is there. It is just a matter of convincing the capitalist class that investing in such technology is worth it in the long run, both for ethical and sound business reasons. While understandable, this position fundamentally misunderstands the nature of the capitalist system.

In his superb book *Facing the Anthropocene*, Ian Angus suggests that a story about the development of capitalism in a world where coal or oil was never discovered might make for an entertaining exercise in speculative fiction. After all, capitalism did exist before fossil fuels became central to its production process and as Andreas Malm points out in *Fossil Capital*, the adoption of coal and steam in manufacturing was not as automatic as some suppose. For example, in 1800 the vast major-

ity of cotton spinning and weaving factories in England were run by water-wheel and thus located by rapids and waterfalls in rural areas. The main impetus in the switch to coal was not that it was cheaper or more reliable; at the time it was neither. It was because it meant such factories could be located in the cities with a large pool of potential workers, thus making it easier to control labour. Such speculative musings aside, by the middle of the nineteenth century capitalism had become firmly wedded to fossil fuel consumption. And as the system grew and spread, so did the emissions.

Today, the burning of fossil fuels is utterly central to modern capitalism. More is invested in oil and gas than any other industry.¹⁸ Virtually every aspect of production, from the mining of raw materials to the transport of finished products relies on the consumption of fossil fuels and the use of their byproducts such as plastics. Many of the goods themselves, like automobiles, run directly on fossil fuels. As well as from production, levels of air pollution caused by the transport of goods are astounding. Goods manufactured in China for Western consumers are shipped in large cargo ships burning sulphur rich 'bunker fuel', the cheapest dirtiest fuel available. A conservative estimate suggests that if freight shipping were itself a nation, it would be the sixth most polluting nation in the world!¹⁹

Capitalism is a dirty system. This is not simply because of its reliance on fossil fuels. At its heart, the system is based on a relentless competition for profits. An inevitable consequence of this is a need for continued expansion: growth at any cost. The history of capitalism is a history of rampant extraction, a ravaging of the Earth's resources for immediate gain without any concern for the future. Despite what individual capitalists may personally feel or what well meaning liberals might hope, the system does not allow for long term planning. So, not only are the needs of most humans ignored, even the long term needs of capitalists (like the survival of the human species) cannot be planned for. This makes it impossible for capitalism to "return to the drawing board" and reconfigure itself in an ecologically sustainable way. A 2011 UN report valued the world's fossil fuel infrastructure at between \$15 trillion - \$20 trillion.²⁰ And investment continues with gusto. The profit making fossil fuel juggernaut has way too much momentum to make a "green shift" worthwhile.

Consider one of the major sources of air pollution: motor vehicles. A salient feature of capitalism is the individual commodification of every aspect of our lives. Free comprehensive public transport would greatly diminish the problem of air pollution and improve life quality in so many ways. However, it is far more profitable for each individual to buy their own car. Ireland is now one of the most motorised countries in the world. This, despite the fact that most Irish towns are utterly unable to deal the effects of so many (increasingly large) vehicles. Considerable resources are spent on the marketing of ever larger motor vehicles and the promotion of an ideology which prioritises an individual's right to pollute over the right to clean air. This is not simply because the CEOs of automobile industry are morally bankrupt. Opposing a comprehensive public transport system is essential to the survival of their industry. By the lights of capitalism, their behaviour is perfectly logical. One notorious example occurred in San Francisco in the 1940s where tramlines which were sorely in need of repair were bought up cheaply by General Motors (GM) only to be removed so as to further motorise the city.²¹ Moreover, as the Volkswagen scandal showed us, the automobile industry is quite prepared to simply break the law in order to push its product.

One of the most insidious aspects of the capitalism is that it turns what should be very ordinary attainable things into almost impossible dreams. Banks and mortgage providers fetishise the very modest idea of having a comfortable place to live as the "dream of owning a home". We are expected to be grateful simply to have a job, something which for many is the least fulfilling part of our lives. Like access to healthcare, security in old age is something we are not guaranteed. None of this is normal. Given the knowledge and resources available, all of these are things our species should easily be able to provide for everyone. This is also the case with clean air. In a civilised society clean air is something we should be able to take for granted. Such a society would have to be based on radical democratic and egalitarian principles, with collective ownership of resources and production planned to enhance human well being. It would necessarily be based on sound ecological principles working to restore damaged eco-systems and heal the 'metabolic rift' caused by centuries of capitalist extraction. In short, this would be a society based on socialist and eco-

logical principles: an eco-socialist society. The struggle for such a society is truly the struggle to breathe free.

Endnotes

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