

## Air pollution

The effects of housing developments on the environment are well known [1- 7] with multiple negative aspects including air quality. In Wales we have already seen speed limits introduced although their positive effects in urban areas are debatable. But, in any case, major housing developments on green spaces will only make the situation worse.

It has been suggested that the popularisation of electric vehicles will solve air pollution problems. Although electric vehicles have very low exhaust emissions, they do have important environmental effects [8,9]. First, they have to be made and, in particular, battery costs and disposal are major considerations. For example, energy use during construction has been estimated to be 59% higher for electric compared to internal combustion vehicles [10]. Also, there are critical raw materials needed and the mechanism of electricity generation during use needs to be properly considered. Some of these aspects should be improved with time.

Of all the air pollutants relevant to N.W. Cardiff, particulate matter is the most serious (see later). Primary particulate matter (PM) comes from non-exhaust emissions. They are equivalent for electric and conventional vehicles [11-16]. Particulate emissions have been estimated to result in over 2000 deaths in Wales per year compared to about 100 deaths from road accidents. Furthermore, PM2.5 are increasingly recognised to cause major health problems to all ages. Particles are a result of braking, tyres and road surfaces [17]. Although regenerative braking systems will help, their use is negated by the heavier weight of electric vehicles [13]. Depending on which study is considered, non-exhaust PM emissions account for up to 85% of total PM2.5 and up to 90% of PM10. The negative effect of heavier vehicles has been underlined by the increasing popularity of SUVs and the consequent increases in vehicle emissions [18].

Considering the effect of air pollution on health in more detail---according to WHO's recent publication on Air Quality Guidelines (2021), Cardiff is already in excess of the recommended values (DEFRA Wales figures). Of the various pollutants, PM2.5 is the most serious because such particles can penetrate the body and, hence, affect every tissue. Moreover, they affect all ages with toxic effects on foetal development through to dementia of the elderly. Examples of particular studies are given in references 19-27. In addition, air pollution exacerbates epidemics such as SARS or Covid-19 [22]. Moreover, it should be noted that the WHO 2021 guidelines are based on evidence from more than 500 scientific papers.

## References

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