

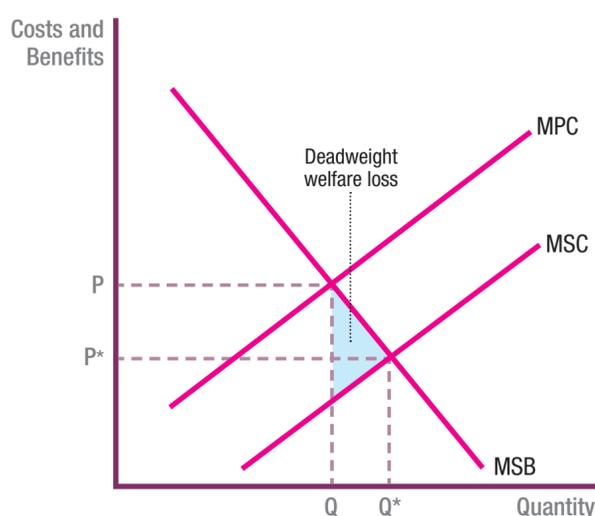
# WIND POWER

## POSITIVE EXTERNALITY IN PRODUCTION



Wind farms are being built at sea and on land, and home wind power is also growing as residential wind power generators are becoming increasingly efficient and practical, especially in the face of rising energy costs.

Wind power has been used for thousands of years as a source of energy, from sailing boats to windmills. The popularity of using wind rose in the 1970s when the price of oil skyrocketed, and wind turbine technology research and development took giant leaps forward. Today, wind-generated electricity is very close in cost to the power from conventional utility generation in some locations. In 2020, 24% of the UK's electricity came from wind power, with on-shore wind being most cost effective.



### Positive externalities of wind production

- Reduction in pollution when generating electricity
- Reduction in sickness, missed work-days and early deaths
- Renewable source of power

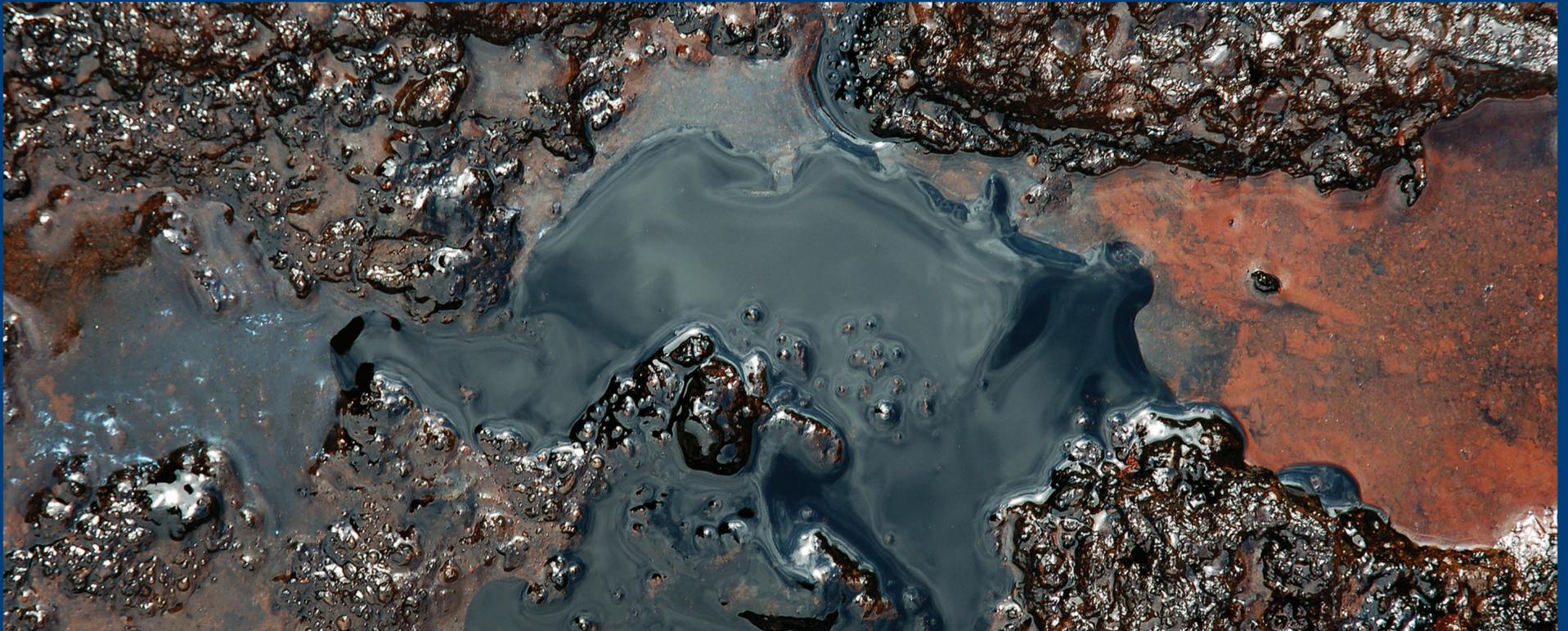
The free market leads to an equilibrium at output  $Q$  which results in **under-production** of electricity produced by wind power when compared to the socially efficient output at  $Q^*$ . If the market failure can be corrected, the blue triangle represents the **potential welfare gain** that society could enjoy. The UK government has paid consumer subsidies to encourage generators to grow the industry.

The world's largest offshore windfarm is the Hornsea One project off the Yorkshire coast which began generating in February 2019. However, at times 'constraint payments' are paid to wind farms to switch off at times when Britain's electricity network is unable to cope with the power they produce.

**2019 was the first year since the Industrial Revolution that zero-carbon electricity – renewables and nuclear – overtook the amount of electricity generated by gas and coal.**

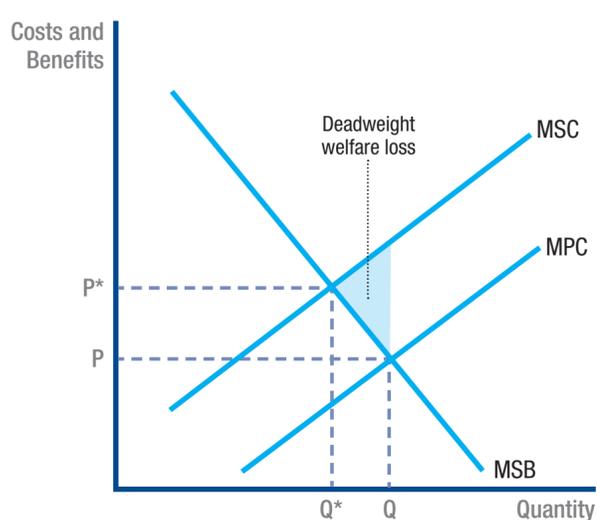
# SOIL POLLUTION

## NEGATIVE EXTERNALITY IN PRODUCTION



Soil pollution is the build up of persistent toxic compounds, chemicals, salts, radioactive materials and disease-causing agents which have adverse effects on plant growth and animal health.

Causes of soil pollution include industrial waste, deforestation, excessive uses of fertilisers and pesticides, rubbish and organic pollution. The organic pollution is derived from the decayed remains of plants and animals. The inorganic pollution results from seepage from landfill sites, percolation of contaminated water into the soil, the rupture of underground storage tanks and farming activities.



### Negative externalities of soil pollution

- Toxic threats to health from contaminated water supplies
- Environmental damage and loss of natural resources
- Loss in value of nearby property

The free market leads to an equilibrium at output  $Q$  which results in **overproduction** of goods and services that result in soil pollution during production, when compared to the socially efficient output at  $Q^*$ .

The blue triangle represents the **deadweight social burden** that society has to suffer as a result of overproduction. The UK government has passed laws that businesses and farms must follow to reduce the incidence of pollution, however there are questions about whether the rules are strict enough. 'Encouraging' businesses to reduce pollution and farms to use biofertilisers, and 'suggestions' of reusing materials are suspected of not being strong enough measures to correct the failure.

*President Franklin D Roosevelt over 70 years ago said, "The Nation that destroys its soil destroys itself". But with increasing demands for food and fuel from a growing global population that is forecast to reach 9 billion by 2050, pressures for more housing and transport infrastructure, as well as climate change, pose huge threats to the quality of soil beneath our feet.*

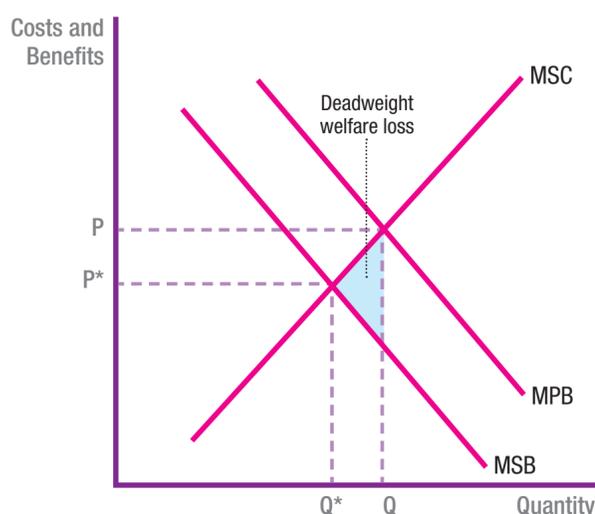
# E-CIGARETTES

## NEGATIVE EXTERNALITY IN CONSUMPTION



E-cigarettes – known as ‘vapes’ – allow consumers to inhale highly addictive nicotine in a vapour rather than smoke. They do not contain tobacco and don’t produce tar or carbon monoxide, two of the most dangerous constituents of cigarettes, so are sometimes seen as a helpful step for smokers to quit smoking. They contain a solution (e-liquid) that typically contains nicotine, a thickener and flavourings such as buttered popcorn, cherry and cola, perhaps enticing young consumers to buy.

E-cigarettes contain some potential harmful chemicals also found in cigarette smoke, albeit at lower levels. There is some evidence that some chemicals are particularly damaging to teenage lungs and experts are becoming increasingly divided over whether vaping causes harm to health. Public Health England claims that vaping is 95% less harmful than smoking which means it is a useful tool for smokers, but many new vapers are joining the market by-passing conventional smoking.



### Negative externalities of vaping

- Potential health damage to young lungs creating costs for the NHS
- Sickness, missed work or school days and early deaths
- Second hand vape fumes (technically aerosol) contain nicotine, ultrafine particles and low levels of toxins that are known to cause cancer

The free market leads to an equilibrium at output  $Q$  which results in overconsumption of e-cigarettes when compared to the socially efficient output at  $Q^*$ . E-cigarettes could also be considered a demerit good.

The blue triangle represents the **deadweight social burden** that society has to suffer as a result of overconsumption of e-cigarettes. The UK government has passed laws that electronic smoking devices cannot be sold to individuals under the age of 18, however the execution of that law is often poor, particularly on on-line sites which rely on the honesty of the consumer only. The UK has strict regulations about the contents of e-liquid, but grey market versions appear.

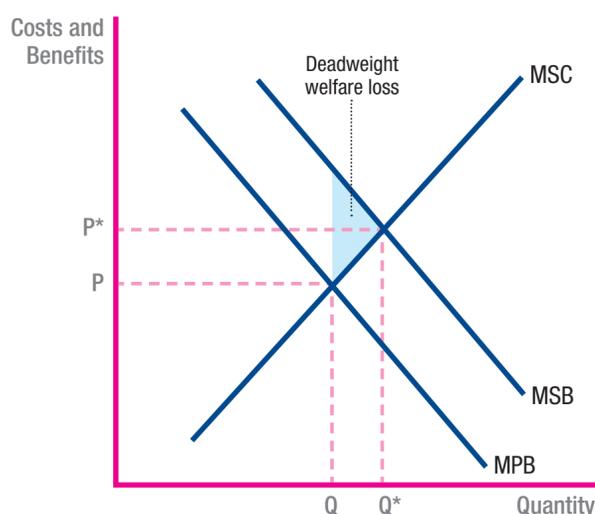
***Smoking itself kills half of life-long smokers and accounts for almost 220 deaths in England every single day.***

# COMMUTER CYCLING

## POSITIVE EXTERNALITY IN CONSUMPTION



Recent years have seen a massive increase in the number of city and town workers who commute by bicycle and has led to many spin-off markets popping up, including bike storage firms, bike apparel firms and sightseeing cycle tours. Furthermore, business landlords and property developers have begun to cooperate to create workplaces for cycling commuters, including ramps running through reception so bikes can be stored outside, washing facilities and lockers in standard office blocks. Firms can apply for a 'CyclingScore', a certifiable accreditation of a building's cycle-friendliness.



### Positive externalities of commuter cycling

- Reduced number of cars on the road so less congestion
- Zero pollution emitted – environmentally friendly
- Spin-off markets appear

The free market leads to an equilibrium at output  $Q_1$  which results in underconsumption of commuter cycling when compared to the socially efficient output at  $Q_2$ . Cycling to work can also be considered a merit good.

The blue triangle represents the potential welfare gain that society could enjoy if more consumers could be persuaded to commute by bike. The UK government introduced a Cycle to Work Scheme in 1999 which encourages individuals to hire or buy a bike at a considerably discounted price (up to 42%) through a nationwide network of cycle retailers. The employer must sign up to an approved bike retailer.

*Further efforts to increase cycling have included infrastructure projects such as dedicated cycle ways and cycle superhighways in London. Other schemes include city bike share which started in 2010 in London, but now has over 25,000 bikes available for sharing and accounts for 19 million trips made annually on public bike share schemes. Many employers are also offering workplace bike pools to and from railway hubs.*

# MEDICAL INSURANCE

## INFORMATION ASYMMETRY LEADING TO OVER CONSUMPTION



Medical healthcare insurance helps to cover the cost of private healthcare, reducing the need to be placed on lengthy waiting lists for the NHS as well as offering some choice about preferred hospitals and consultants and potential diagnostic testing. In return for a monthly or annual premium, a medical insurance company will pay for private healthcare in the event that it is needed.

Consumers of medical insurance have differing levels of health, however the medical insurance company does not know if the consumer is a high risk (unhealthy) consumer or a low risk (healthy consumer). An unhealthy consumer is more likely to need treatment and should, in theory, pay a higher premium than the low risk consumer. If the insurance company was unable to identify individual needs, they would charge an average premium: a bargain for the unhealthy person and expensive for the healthy person. This would lead to **adverse selection** and potentially, in turn, to **moral hazard**.

### **Adverse Selection**

When buyers have better information than sellers

### **Moral Hazard**

When an individual has an incentive to alter their behaviour to take more risks as someone else bears the cost of those risks

Insurance companies go to considerable lengths to ensure they receive full information about potential consumer's levels of health:

- Compulsory medical check ups
- Different premiums for different age groups and occupations
- Different length of contracts
- Interviews and questionnaires

Having medical insurance could possibly encourage individuals to over-consume health care compared to the non-insured individual.

# PENSION PROVIDERS

## INFORMATION ASYMMETRY LEADING TO UNDERCONSUMPTION



A pension plan is a retirement plan into which money is paid during the working years, and once retirement is reached, the pension can pay out a lump sum or an annual annuity (in effect an income), or both. Despite the simple idea behind purchasing a pension plan, the complexities of individuals plan choices and plethora of providers makes choosing a pension plan extremely complicated.

Even the Chief Economist at the Bank of England admits to finding pensions ‘confusing’ and ‘not being able to make the remotest sense of pensions’. There are many rules about what you can and cannot do, for example how much you can put into a pension, what happens to your fund if you die, and types of pension schemes available. Successive governments have added rule upon rule making the layers of legislation hard to understand. Add to this the complexities that profit-maximising, private sector insurance companies add in an attempt to keep your money rather than pay it back out, and there is information overload in the industry – leading to chronic underconsumption of pension plans.



A further reason for underconsumption of private pension plans is the state pension which is based on national insurance contributions (NICs) which many individuals feel will support them in retirement. In reality the UK state pension scheme was recently graded a ‘C+’ on a Global Pension Index, meaning it has some good features but there are major risks and shortcomings and requires considerable improvement.

Further complications occur when considering **personal pensions** versus **workplace pensions**, which can further be split into more categories. **Mis-selling scandals** in the industry lead to further underconsumption.

The UK government offers tax relief on money put into pensions in order to encourage savings and have attempted numerous times to simplify the industry, without success, in order to increase consumption by individuals.

# WiFi ZONES QUASI-PUBLIC GOOD



A public good has two main features: it is non-rivalrous and it is non-excludable. If a good is non-rivalrous in consumption, this means that the consumption by one individual does not in any way prevent the simultaneous consumption by another consumer. The cost of providing it to a marginal (additional) consumer is zero.

For example, in a classroom if the teacher is consuming the light from the overhead lighting, this does not prevent the students from doing so simultaneously. **Non-excludability** refers to the inability to stop other consumers from consuming the good once it is provided. Non-paying consumers cannot be prevented from using the good, for example if an individual cannot be prevented from using the light from street lighting once it has been provided for the community. Pure public goods lead to the **free rider problem**.

## The free rider problem

When consumers benefit from a good/service without paying towards it.

In a free market, the free rider problem means the good/service will be underprovided, or not provided at all – leading to missing markets.

	Excludable	Non-excludable
Rival	<b>Private goods</b> e.g. cars, clothing, food and drink	<b>Open access</b> e.g. ocean fish, common land drink
Non-rival	<b>Quasi-public goods</b> e.g. toll roads and toll bridge, congested road routes, town centre parks	<b>Quasi-public goods</b> e.g. defence, street lighting, lighthouses



A quasi-public good has many, but not all the features of public goods. At some point they become rivalrous. For example, in a busy Wifi zone, the network becomes over-crowded and no more consumers can join the network, making it rivalrous.

- Often Wifi networks have passwords and or encryption keys that make the network excludable, thus giving it private good qualities.
- Australia is one country at the leading edge of providing public networks as it believes access to the knowledge economy brings positive externalities to the whole community.

# CLIMATE CHANGE MITIGATION GLOBAL PUBLIC GOOD

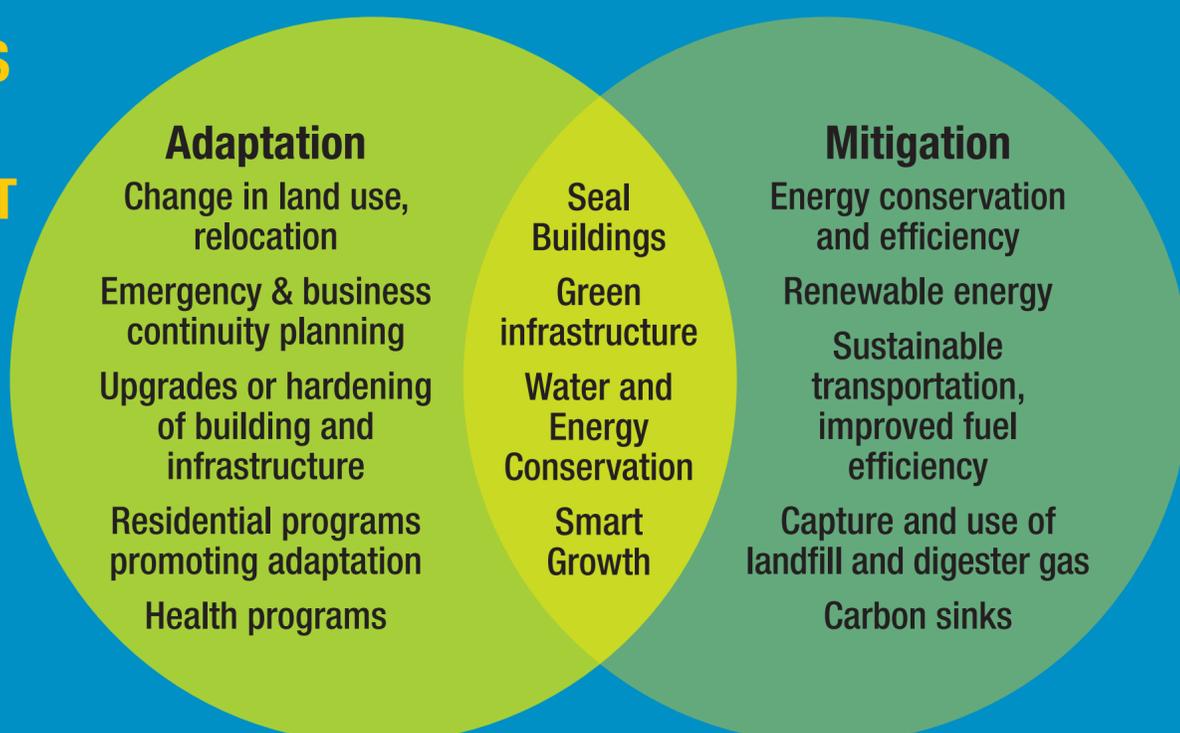


A global public good is a public good available on a more-or-less world-wide basis. It is a concept of American economist Paul Samuelson's classic notion of a public good to the economics of globalisation. A global public good will be non-rivalrous in nature and non-excludable too. Climate change mitigation means actions that are taken to reduce and curb greenhouse gas measures. Adaption measures are based on reducing vulnerability to the effects of climate change.

**Mitigation addresses the CAUSES of climate change**

**Adaptation addresses the IMPACT of climate change**

Global public goods often require international or supranational legal entities (both private and government run) to manage these goods. As each global public good requires a different legal structure to run it, this can contribute to a proliferation of non-governmental organisations (NGOs) and intergovernmental organisations (IGOs) to help manage supply.



Examples of global public goods:

- Financial stability
- Global public health
- Knowledge production
- Drinking water