

FACTFILE: GCE ENVIRONMENTAL TECHNOLOGY

TRANSPORT SYSTEM CHALLENGES



Transport System Challenges

Learning outcomes

Students should be able to:

- outline the four key challenges of developing a way to transport people and goods in the future:
 - economic viability;
 - environmental impacts;
 - dependence on fossil fuels; and
 - user safety.
- understand the role of new vehicle (public and private) technologies including:
 - hydrogen-fuelled vehicles;
 - biofuelled vehicles; and
 - electric and hybrid vehicles;
- describe the physical infrastructures required for each of the technologies described to function effectively; and
- assess the effectiveness of different strategies to reduce transport demand, including public transport, sustainable modes of transport (walking or cycling), fuel and vehicle taxation, congestion charging, air travel levies and use of technology, for example videoconferencing or apps to reduce congestion.

Course Content

It is a generally accepted concept that transport is vital to the future development of the economy.



However, this can lead to a situation where the increasing need for transport development can be at odds with government targets with regard to the environment in general. Various studies have shown that the option of continually increasing transport links and increasing economic prosperity is not viable. Equally the argument is put forward that to be environmentally aware and responsible does not necessarily have to lead to a reduction in overall prosperity.

(ref: *Stern Review 2006* & www.official-documents.gov.uk/document/cm72/7226/7226.pdf)

Developing transportation systems for the future presents a number of challenges;

- The cost of developing new transportation systems has to be set against their economic worth. Studies, such as Eddington, have argued the case that expansion of the transport network does not necessarily benefit from a proliferation of new links but would be more

economically viable if a targeted approach was taken towards the most seriously congested parts of urban, national and international networks.

- Any new transportation link will have to confront the environmental impact it creates either due to increased gas emission or destruction of habitat. Indeed central government has set transport goals for carbon dioxide emission for current and proposed transport developments.
- Increased transportation systems if based on current technologies will lead to increased dependence on fossil fuels. Consequently variations in the price of fuel can impact on economic viability and the overall transport system is at risk from delays or stoppages in supply due to political or terrorist action.
- The safety of transport users is obviously important. Users want to travel in a safe environment which is prompt in terms of departure and arrival. Safety can also be compromised by increased crime and terrorist activity.

Current transportation methods are approximately just over 90% dependent on oil as a fuel and raw material. Given the finite nature of the world's oil supplies and associated environmental issues there have been a range of developments in the field of alternative vehicle technologies such as;

- Hydrogen fuelled vehicles use hydrogen as an on board fuel. It is used in a range of vehicles for domestic and commercial purposes. The power plant in these vehicles convert the chemical energy contained within the hydrogen to mechanical energy by either burning the hydrogen in an internal combustion engine or by reacting hydrogen with oxygen in a hydrogen fuel cell (PEM type) to power electric motors. Various concept cars have been developed to utilise



the technology as have some forms of public transport. Hydrogen fuelled vehicles would require extensive hydrogen pipeline networks to specialised hydrogen filling stations. Due to the combustible nature of hydrogen there would be considerable health and safety issues to be considered in this process.

- Biofuelled vehicles use a form of fuel which has been derived from organic materials. In order to provide fuel for these there will have to be a



significant increase in the amount of bio fuel being produced. This has implications for land use which could increasingly move from other essential activities such as purely agricultural use for the production of food. There would also have to be a programme of adaptation of existing filling stations so that users could access a regular and convenient source of supply.

- Electric and hybrid vehicles use onboard batteries as a power source either as the sole source of power or in the case of a hybrid vehicle in tandem with a traditional form of diesel or petrol engine. Purely electric cars



have been in development for a number of years and in particular since the energy crises of the 1970s and 1980s. There has been a significant increase in interest in electrically powered vehicles in recent years due to

concerns about increasing oil prices and the need to reduce greenhouse gas emissions. Currently these cars can prove to be expensive to purchase. There is a need for regular re-charging which can be done at home or increasingly charging points are being installed in public areas such as car parks. The hybrid vehicle uses two power sources and an element of charging necessary for the electric part of the power source can be gained from the other source. This form of technology is used in a number of readily available cars and some forms of public transport e.g. trains.

In order to address the various issues presented by increasing transport demands government, both national and local, has identified a number of different strategies such as;

- increasing public transport by providing more and regular services at competitive rates and the introduction of more bus lanes and park and ride facilities;
- promoting sustainable modes of transport e.g. walking or cycling by developing the cycle network and having schemes to persuade people to cycle to work;

- increases in fuel and vehicle taxation to dissuade some types of vehicle and decreases in taxation for certain types of car which use less fuel;
- the introduction of congestion charging in urban areas to reduce traffic levels and to improve air quality; and
- using air travel levies to deal with increasing levels of air traffic.

There is also the possibility that developments in communications technology such as video conferencing and use of apps can reduce the need for business travel.

Pupil Activity

Pick a journey of your choice and produce a list of the various measures encountered on the journey which are designed to reduce traffic levels and/or exhaust emissions. In your opinion do these measures have an impact

