

Unit 26: Sustainable Transport

Unit code:	D/602/6005
QCF Level 3:	BTEC National
Credit value:	10
Guided learning hours:	60

● Aim and purpose

This unit enables learners to understand the economic, environmental and social impact of current transportation systems, and to explore more sustainable alternatives whilst maintaining effective services. Learners will also develop skills in identifying improvements to sustainability for leisure travel.

● Unit introduction

Transport is important and matters to everyone. In addition to people needing to travel by vehicles for business, leisure or personal needs, almost everything we use or consume every day will have been moved by a freight operator. As well as the need to meet these demands in an economically viable way, there is also an environmental and social cost in terms of noise, congestion, air pollution and safety. Most transport vehicles rely on fossil fuels, with significant effects on individuals, the community and the environment. This unit will develop learners' understanding of the necessity to balance the demand for efficient transport services with the long-term effects on sustainability.

This unit enables learners to explore alternatives to fossil fuels for transport vehicles as well as ways to access goods and services which could help to reduce vehicle movement. The unit introduces toolkits and instruments currently available for conducting a simple emissions comparison, and learners will be able to use these resources in a practical way. Learners will develop knowledge and understanding in exercising judgement as to the suitability of alternatives for specific transport needs.

Learners will also develop an understanding of the wider benefits on health and wellbeing of using alternatives to motor vehicles.

Anyone involved in public transport planning needs to understand how people make decisions about using public transport or private vehicles. This unit explores the factors involved in those decisions, including some of the perceived barriers to selecting public transport.

The unit explores incentives and schemes which industry, communities or individuals can be part of, and learners will discuss the effectiveness of such incentives and schemes in improving sustainable transport development.

The unit underpins other units in the qualification as it reinforces the need for individuals to continually question government policy to ensure that economic, environmental and social sustainability have been considered.

● Learning outcomes

On completion of this unit a learner should:

- 1 Understand alternatives to fossil fuels for transport vehicles
- 2 Understand the wider benefits of reducing movement by vehicles
- 3 Understand the impact of incentives and penalties on the public and on transport providers
- 4 Be able to identify improvements to sustainability for leisure travel.

Unit content

1 Understand alternatives to fossil fuels for transport vehicles

Alternative fuels: vehicle fuels derived from sources other than petroleum eg biodiesel, biogas, ethanol, fuel cell, hydrogen, natural gas, solar

Alternative fuel conversion: vehicle manufacturers approved list for conversions to Liquid Petroleum Gas (LPG); converting diesel to vegetable oil considerations; fuel consumption; power; duty to be paid

Assessing fuels for sustainable options: options eg holistic approach to sustainability, the effect on the environment, local and wider, current and future, the economic cost and benefit to how the social fabric of society will be enhanced, considering detrimental effect to the social fabric, local and extended, current and future; sustainability assessment instruments eg Brundtland sustainability portal, environmental audit, ecological footprint, social impact assessment, sustainability indicators

Sustainability: economic; environmental; social; meeting the needs of the present without compromising the ability of future generations to meet their own needs

2 Understand the wider benefits of reducing movement by vehicles

Economic benefits: increased use of public transport by paying passengers makes routes more viable; walking, cycling, liftshare schemes reduce personal expenditure on fuel costs

Environmental benefits: reduced drain on Earth's resources eg fossil fuels; less need for highways maintenance; reduction in wildlife deaths due to collision with vehicles

Social benefits: health and wellbeing; improved air quality; reduced traffic congestion in built-up areas; ease of movement for pedestrians; reduced incidences of traffic accidents; increase in social interaction eg walking bus, park and stride, community minibuses, walk to school week, liftshare schemes

3 Understand the impact of incentives and penalties on the public and on transport providers

Incentives: for public eg bus passes, free or reduced travel, shopper buses, coupons in media or with sponsorship; cycle racks, cycle paths; showers at work; loans for cycle purchase/training for cyclists; car share scheme; for schools eg travel plan grants; incentives for transport providers eg freight grant for taking freight from road and encouraging rail or water use, bus company subsidies

Penalties: schemes eg car parking tickets, clamping tow away zone; congestion zone charges, toll roads, high car park prices, shorter time allowances for town centre car parks, tax on fuel

Barriers for people using public transport or leaving the car at home: barriers eg cost, availability of public transport, safety (travelling late at night), communications of timetable, not knowing when or whether the transport will arrive, efficiency of vehicle, places to put accessories, laptops, luggage, shopping, no conductors on buses or trains, no help for disabled, elderly or people with children

4 Be able to identify improvements to sustainability for leisure travel

Leisure travel: eg holidays, social activity, non-essential trips, private motor vehicle, air travel

More sustainable options: alternatives to using car or plane eg train, walking, cycling, public transport; comparing the carbon dioxide emissions of the four main modes of transport (car, rail, bus/coach and plane) for a journey using web-based toolkits; case studies eg Department for Transport Sustainable Towns study

Investigation: eg case studies, surveys, press articles, advertising literature; using assessment toolkits to measure carbon dioxide (CO₂) impact of various methods of travel

Promotional tools: eg leaflets, posters, websites, advertisements; social networking; incentives eg competitions, loyalty cards (rail users cards, discounted travel); awareness campaigns, promoting wider benefits

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 assess alternative fuels, in terms of their economic, environmental and social sustainability [IE4; SM2]	M1 justify which alternative fuel would be the preferred sustainable option for a specific mode of transport	
P2 discuss the economic, environmental and social benefits of reducing vehicle use in a selected locality [CT1, 2; SM6; EPI]	M2 analyse the economic, environmental and social sustainability benefits of reducing vehicle use	
P3 explain relevant current incentives for a selected individual to reduce their car use [IE2, 4]	M3 explain the impact of incentives to improve sustainability in transport provision	D1 evaluate an incentive or penalty scheme, commenting on its effectiveness to help sustainable transport use
P4 discuss valid incentives for a named transport provider to operate in a sustainable way [IE2, 4]		
P5 carry out an appropriate investigation into sustainable leisure travel alternatives to private car use for travelling to a named destination [IE4; EP6]	M4 design a campaign tool to persuade private car owners to opt for different modes of travel for leisure purposes.	D2 evaluate effectiveness of the campaign tool, recommending improvements to design or use.
P6 discuss sustainable leisure travel alternatives to private car use, including benefits and drawbacks. [IE6; CT1; EP4]		

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Delivery should stimulate, motivate and educate learners. The intention of this unit is that learners become aware that, although the provision of transport and ancillary infrastructure is essential to our quality of life and to local and national economies, there can be a high price to pay in terms of environmental damage and the drain on resources. Delivery should clearly address these issues and highlight the emerging sustainable alternatives that can minimise the environmental impact of transport provision without compromising the necessity for modern and efficient services.

Learners should be given the opportunity to explore economic, environmental and social sustainability. This can be supported by site visits or by studying schemes and initiatives as well as applying sustainability assessments to case studies. Group activities are encouraged to engender debate and discussion, but tutors will need to ensure that individual learners have equal experiential and assessment opportunities. If group work is used, each learner must individually produce sufficient evidence to meet the assessment and grading criteria.

Visiting speakers and visits to workplaces where the issues are addressed as a matter of course will add to the relevance of the subject. Health and safety guidance, protocols and guidelines for specific workplaces must be adhered to when undertaking visits. Tutors should ensure that any concerns are addressed prior to embarking on visits.

Delivery of this unit could include a mix of tutor-led discussions, investigative work and practical application. Learners need to develop a clear understanding of the reasons behind the requirement to address the issues, and the potential impact of current decision making for future transport provision. Because of the present and evolving nature of the subject, access to appropriate online sources will be important.

Case studies could be used to demonstrate the ways in which industry is responding to the demands of sustainability, as well as identifying the complexity and diversity of the issues faced by transport providers and users.

Learners should be encouraged to compare the carbon dioxide emissions of the four main modes of transport (car, rail, bus/coach, and plane) for a journey. This can be done using an online tool such as Transport Direct's (TD) emissions calculator (see *Websites*).

Learners need to present a persuasive case for effecting change in behaviour throughout the unit, but particularly for learning outcome 4. Learners should explore some of the reasons why individuals and organisations resist embracing more sustainable options and, as they gain confidence in the subject, this will help develop influencing skills.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and assessment
Introduction and overview of the unit.
Class discussion on content and resources.
Learners begin to look through content and how to access resources.
Group discussion on fossil fuels. Individual research on alternatives to fossil fuels for motor vehicle use.
Visit to a fleet company which has some or all vehicles using alternative fuels.
Tutor-led session on economic, environmental and social sustainability. Discussion: Brundtland Commission definition of sustainable development and the sustainability portal. Exercise: applying the tool to various issues, provided by class involvement.
Assignment 1: Selecting an Alternative Fuel Source for a Motor Vehicle (P1, M1)
Tutor introduces the assignment brief.
Learners present their findings, either written or verbally, with or without a visual presentation, on a fuel source which could be used to power a motor vehicle. Learners justify why they have chosen that particular fuel source.
Tutorial session and individual learner research exercises.
Video news footage: eg fuel tanker driver strikes 2008, Buncefield Oil Depot explosions and fire of December 2005, snow-hit Britain 2010. Discussion on impact of delivering goods and services.
Individual and group research on alternative ways of accessing services and goods. Class exercise applying sustainability portal tool to some of the alternatives.
Assignment 2: Accessing Goods and Services if Vehicle Movements were Restricted or Unavailable (P2, M2)
Tutor introduces the assignment brief.
For example bad weather, strikes, unavailability of fuel. Learners identify a situation where vehicle movements have been restricted, drawing on real documented case studies. For the situation selected, learners summarise the effect of goods and services provision, and how a consumer might be able to access those goods and services in a different way.
Tutorial session and individual learner research exercises.
Visit from representative of a large employer in the area, to talk about travel incentives for staff and clients. Class research on local and national initiatives to encourage less car use.
Class discussion: barriers for people choosing public transport or leaving the car at home. Individual or group activity: learners draw up top reasons and try to find ways to address the top 10.
Penalties for car drivers: visit from local vehicle parking enforcement officer. Learners make own notes and consider the following questions: Are all penalties about money? If someone has plenty of money, might this make them use the car more as a mark of prestige?
Freight grants: identifying an existing transport provider which might be eligible for a freight grant, if they worked in a different way, using local resources. Learners draw up a proposal for the transport provider. If possible, arrange for a transport provider that has secured a freight grant to visit and explain the process, the costs and the benefits.

Topic and suggested assignments/activities and assessment

Assignment 3: Incentives and Penalties (P3, P4, M3, D1)

Tutor introduces the assignment brief.

Learners research and identify an incentive for a transport provider or a transport user which might encourage them to operate in a more sustainable way.

Tutorial session and individual learner research exercises.

Case study: the effect of smarter choice programmes in the Sustainable Travel Towns of Darlington, Peterborough and Worcester. Group exercise assessing programme for economic, environmental and social sustainability. Feed back to class with any suggested improvements.

Assignment 4: One Small Change in Travel Habits to Improve Economic, Environmental and Social Sustainability (P5, P6, M4, D2)

Tutor introduces the assignment brief.

Learners identify a way of reducing car or plane travel. They could design a promotional tool to encourage colleagues, friends or family members to consider this more sustainable option and report on beneficial outcomes to economic, environmental and social sustainability as a result of implementing this change.

Tutorial sessions and individual learner research exercises.

Unit review and evaluation.

Assessment

For P1, learners need to assess what is currently available in the way of alternatives to fossil fuels for all types of transport vehicles, in terms of their economic, environmental and social sustainability. The information sought is documented in the *Unit content* section, and learners can either produce evidence verbally as a presentation (supported by appropriate assessor observation records) or as a report.

For M1, learners need to be aware of sustainability assessment tools such as the Brundtland or others. Learners should select examples from the evidence presented for P1, and use a sustainability assessment tool to make the necessary comparison. Learners can then present a report on which alternative fuel would be the preferred sustainable option for a specific mode of transport, justifying their reasons. The mode of transport can be identified by learners, or by the tutor, whichever seems most appropriate. The report can be presented as an annotated diagram, such as a flowchart, or as a written report.

For P2 and M2, before discussing the economic, environmental and social benefits of reduced vehicle movements, learners will need to be aware of ways to access goods and services and why this may be necessary. This is important to ensure that any reports, discussion or conclusions map back to the aim and purpose of this unit. Learners could explore issues which may have an impact on everyday goods and service delivery, they could use a case study, either one of the suggested examples in the *Outline learning plan* or from another source, and discuss how goods and services could continue to be delivered. Any benefits to accessing in this way should be noted, especially for economic, environmental and social sustainability, short term or long term. Evidence can be in the form of a discussion, written report or a visual presentation (supported by an appropriate assessor's observation record or witness testimony).

For P3, P4, M3 and D1, learners need to be aware of incentives (and penalties) currently in existence. Conducting research in their own environment would be helpful, so learners can note incentive examples such as free or subsidised public transport in their local area, car share schemes at a workplace, and even provision of cycle racks and showers at college or workplaces to encourage reduced car use.

For P3 and P4, learners need to explain appropriate incentives making it clear which are for individuals (P3) and which are for transport providers (P4). For M3, learners need to explain the impact of incentives to improve sustainability in transport provision, giving reasons and/or evidence to support their explanation. Criterion D1 expands the focus to include an evaluation of the penalty measures as well as incentives, and learners' independent research may uncover examples such as monetary fines, toll roads, and high car park prices. For M3 and D1, a discussion, written report or visual presentation would be appropriate methods of assessment.

For P5 and P6, learners should select at least two different leisure travel methods to the same destination, and research each to establish which is the perceived more sustainable option. Learners should look at this option in depth, and produce a report on whether choosing this alternative would be totally beneficial in all aspects of sustainability, or if there may be some detrimental effects. Learners could give either a verbal or written report, commenting on advantages and disadvantages. Example: For leisure travel to a domestic or close foreign destination, a train journey may be the selected option, instead of aeroplane. This would have clear environmental benefits, and possibly social benefits, but perhaps not economic ones as train travel is often more expensive than cheap flights. Also, the journey may take longer, so that the traveller loses time at work, and possibly earnings, and may have to spend more on refreshments, or overnight stays if trains do not connect.

For M4, learners need to design a campaign tool, and there is a lot of scope for creative thought here. They could produce a DVD, poster, leaflet, or visual demonstration, or do a verbal promotion along the lines of a public information commercial. The assessment should ensure that learners have included the wider benefits of choosing sustainable travel alternatives for leisure. For example, health and wellbeing benefits in addition to environmental benefits.

For D2, learners should test the campaign tool, probably in their own environment, and evaluate its effectiveness, with recommendations for future use. Evidence would be best produced as a report or presentation.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment title	Scenario	Assessment method
P1, M1	Selecting an Alternative Fuel Source for a Motor Vehicle	As fleet manager of a company you have been asked to research alternatives to fossil fuels, and to make a recommendation which will address concerns from the senior management team.	Written or verbal report. Visual presentation. Observation record.
P2, M2	Accessing Goods and Services if Vehicle Movements were Restricted or Unavailable	As a small business owner, how would you continue with daily business needs, eg getting deliveries, banking takings, serving customers, if vehicle movements were restricted or unavailable?	Report.
P3, P4, M3, D1	Incentives and Penalties	You are a manager of a public transport company and have been asked to research to help a promotion to encourage greater public use.	Written or verbal report. Observation record.
P5, P6, M4, D2	One Small Change in Travel Habits to Improve Economic, Environmental and Social Sustainability	As an individual you want to make changes to your own behaviour and to influence others so decide to produce a promotional tool, to encourage people to reduce their private car use.	Leaflet or DVD or web page/blog/twitter. Presentation. Observation record.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC Environmental Sustainability sector suite. This unit has particular links with the following units in the BTEC Environmental Sustainability suite:

Level 3
Understand the Principles of Sustainable Development
Sustainable Communities
Undertake an Extended Investigative Project in the Environmental Sustainability Sector
Undertake an Investigative Project in the Environmental Sustainability Sector
Work-related Experience in the Environmental Sustainability Sector
Pollution Control and Management
Sustainable Facilities Management
Urban Environment

Essential resources

Learners need access to computers to research information on the internet, and through the media. Access to video footage of real-life incidents would be beneficial, for example 2008 fuel tanker driver strikes or 2010 snow-hit Britain. Transport will be required for site visits to organisations who have promoted or implemented sustainable transport use.

Access to case studies would be beneficial. For example, how individuals, groups of people or organisations have implemented sustainable transport or travel initiatives.

Employer engagement and vocational contexts

Forming links with a local company, preferably a large employer in the area, which has addressed the need to help staff, clients and suppliers with transport and travel issues, would be beneficial. Forming links with a fleet, haulage or commercial transport company that has some or all of its vehicles running on alternatives to fossil fuels is encouraged. If such a company cannot be located in the area, then a local authority department could be approached instead.

Indicative reading for learners

Textbooks

Edwards A R – *The Sustainability Revolution: Portrait of a Paradigm Shift* (New Society, 2005)
ISBN 9780865715318

Himanen V, Lee-Gosselin M, Perrels A – *Building Blocks for Sustainable Transport: Obstacles, Trends, Solutions* (Elsevier Science, 2008) ISBN 9780080447094

Rietveld P and Stough R (editors) – *Barriers to Sustainable Transport: Institutions, Regulation and Sustainability* (Transport, Development and Sustainability Series) (Routledge, 2004) ISBN 9780415323628

Semlyen A – *Cutting Your Car Use: Save Money, Be Healthy, Be Green* (Green Books, 2007)
ISBN 9781900322157

Sloman L – *Car Sick: Solutions for Our Car-addicted Culture* (Green Books, 2006) ISBN 9781903998762

Sustrans – *Do Humans Dream of Electric Cars?* (Alastair Sawday, 2009) ISBN 9781906136284

Websites

Department for Transport (freight grants)	www.dft.gov.uk/pgr/freight/grants
Department for Transport (local transport plans and policies)	www.dft.gov.uk/pgr/regional/lt/guidance/localtransportplans/policies/sustainabletransport
Department for Transport (sustainable smarter choices)	www.dft.gov.uk/pgr/sustainable/smarterchoices/smarterchoiceprogrammes/pdf/summaryreport.pdf
LiftShare	www.liftshare.com
Sustainable Stuff	www.sustainablestuff.co.uk
Sustrans UK	www.sustrans.org.uk
Transport Direct emissions calculator	www.transportdirect.info/Web2/JourneyPlanning/JourneyEmissionsCompare.aspx/
UK Energy Saving (alternative fuels)	www.uk-energy-saving.com/alternative_fuel.html
UK LPG Installers	www.drivelpg.co.uk/Al

Journals

Department for Transport: *Traffic Management Division Manual for Streets* (2007) ISBN 9780727735010

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are ...
Independent enquirers	assessing alternative fuels in terms of their economic, environmental and social sustainability explaining current incentives for a selected individual to reduce their car use discussing valid incentives for a named transport provider to operate in a sustainable way carrying out an appropriate investigation into sustainable leisure travel alternatives to private car use discussing sustainable leisure travel alternatives to private car use, including benefits and drawbacks
Creative thinkers	discussing the economic, environmental and social benefits of reducing vehicle use in a selected locality discussing sustainable leisure travel alternatives to private car use, including benefits and drawbacks
Self-managers	assessing alternative fuels in terms of their economic, environmental and social sustainability discussing the economic, environmental and social benefits of reducing vehicle use in a selected locality
Effective participators	discussing the economic, environmental and social benefits of reducing vehicle use in a selected locality carrying out an appropriate investigation into sustainable leisure travel alternatives to private car use discussing sustainable leisure travel alternatives to private car use, including benefits and drawbacks.

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are ...
Reflective learners	testing the campaign tool, and reporting back on its effectiveness, with recommendations for future use
Self-managers	conducting research in their own environment to note examples of incentives to reduce private car use, and the effectiveness of each example
Effective participators	presenting a persuasive case for effecting change in behaviour, such as designing a campaign tool for choosing sustainable leisure travel options.