GLAECONOMICS

Single/Double Summer Time: The time is right for London

Transport for London

LONDON DEVELOPMENT AGENCY

MAYOR OF LONDON

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GLA Economics provides expert advice and analysis on London's economy and the economic issues facing the capital. Data and analysis from GLA Economics form a basis for the policy and investment decisions facing the Mayor of London and the GLA group. The unit is funded by the Greater London Authority, Transport for London and the London Development Agency.

Contents

Executive summary

This report analyses the potential impact on London of a change in clock time for the UK from Greenwich Mean Time/British Summer Time to Single/Double Summer Time (SDST). The clocks would be one hour ahead of Greenwich Mean Time (GMT) in the winter and two hours ahead of GMT in the summer (hence the name "Single/Double Summer Time"). Such a move would increase the amount of daylight in the evening by an average of 55 minutes offset by darker mornings during Winter. This would better align hours of daylight to the waking hours of the majority of the population. The report focuses on the following areas: Road casualties, Crime, Energy efficiency, Health, Business activity, Financial and Business Services communications, Tourism and Leisure, and Transport with the impacts shown in Table 1 quantified where possible.

Table 1: Single/Double Summer Time – The benefits for London

Area	Impact	Amount (per annum)
Road casualties	Positive	£14.1 million (2007 prices)
Crime	Reduced fear of crime	na
Energy efficiency	Positive	£20 million
Environment	Positive	80,000 tonnes of CO_2
Health	Positive	na
Business activity	Positive	na
Financial and Business Services communications	Positive	na
Tourism and Leisure	Positive	Between £240 million and £720 million (2006 prices)
Transport	Positive	na

When surveyed in 2005 the UK's population expressed itself in favour of SDST. After explaining the evidence about road casualty rates which have often been misquoted, the approval rate for SDST was as high as 76 per cent in London and 71 per cent in Scotland.

London businesses appear to favour such a move in the clock time. In April 2010 the London Chamber of Commerce and Industry conducted a survey of 182 of its members, asking if SDST would be beneficial to their business. The responses showed that more than a third of London firms (36 per cent) expected that a change to SDST would benefit their business, compared to just 8 per cent who feared a negative impact. Fifty-one per cent of businesses thought that there would be no difference and 5 per cent did not know.

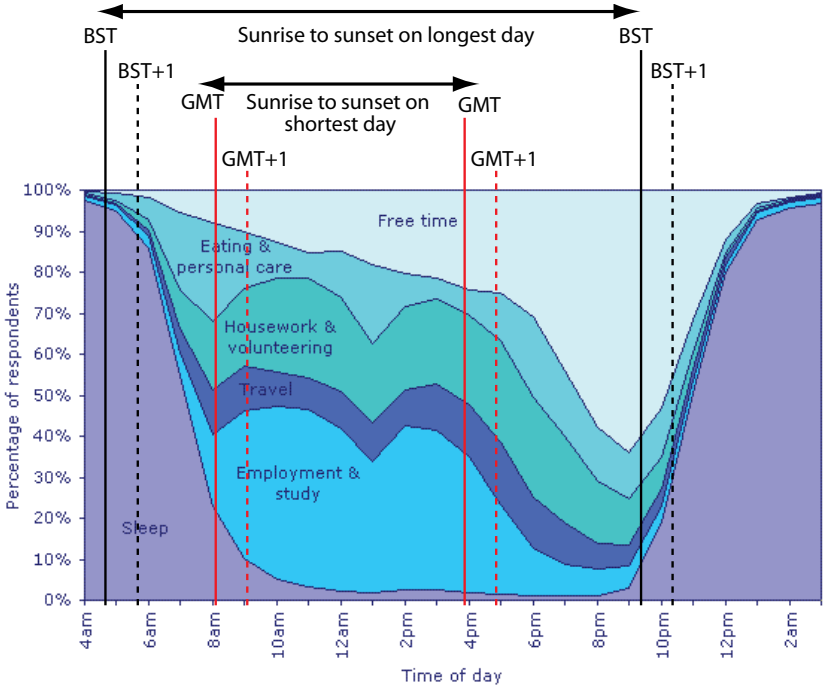
This research shows a strong case for a move to Single/Double Summer Time as far as London is concerned. Likely benefits can be quantified for a reduction in road casualties, an increase in energy efficiency and lower CO_2 emissions. There would also be a boost to tourism. Benefits in other areas – health, reduced fear of crime, business activity, financial and business services communications, and transport – are less amenable to quantification but could be considerable.

Introduction

Supporters of a move to Single/Double Summer Time (SDST) in the UK want to see the clocks year-round an hour ahead of the current time – in other words, the same time as in France, Germany and Italy (and Switzerland, although it is not in the EU).[1] The clocks would be one hour ahead of Greenwich Mean Time (GMT) in the winter and two hours ahead of GMT in the summer (hence the name "Single/Double Summer Time").

The move to SDST would increase the amount of daylight in the evening by an average of 55 minutes.[2] It would better align hours of daylight to the waking hours of the great majority of the population. Figures 1 and 2 showing activity by time of day for weekdays and weekends help to illustrate this.

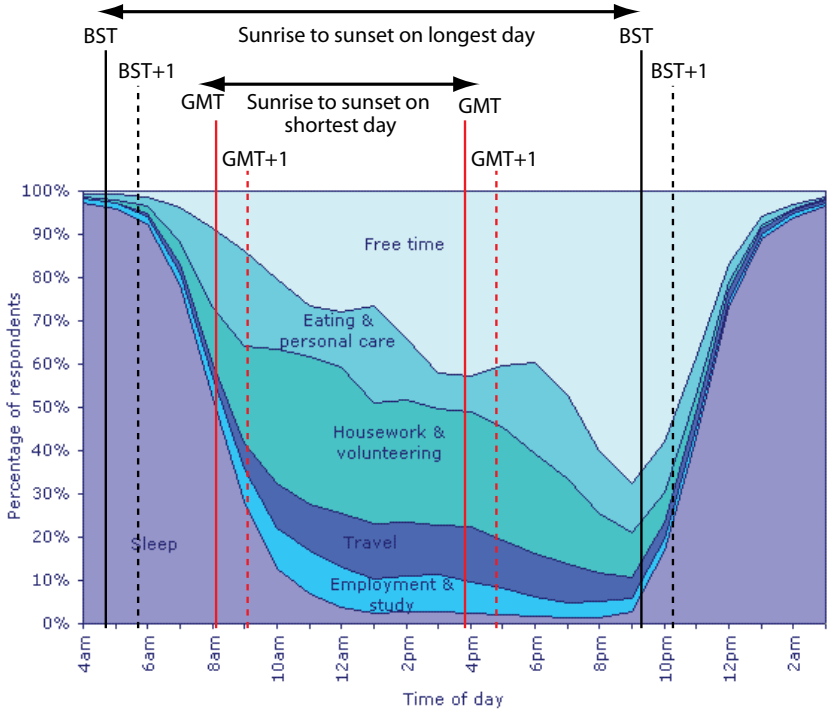
Figure 1: Activity by time of day for weekdays for London
(Over 16s only)



[1] In addition to the UK, there are nine EU members who do not have Central European Time. Bulgaria, Cyprus, Estonia, Finland, Greece, Latvia, Lithuania and Romania all have GMT+2 in the winter and GMT+3 in the summer. Ireland has the same time as the UK.

[2] M Hillman, Time For Change: Setting Clocks Forward By One Hour Throughout The Year – A new review of the Evidence, Policy Studies Institute, 1993. The reason it is 55 minutes (and not an hour) is because of a slight preponderance of days under the existing BST/GMT regime which would remain dark in the late afternoon even with the hour taken forward under SDST.

Figure 2: Activity by time of day for weekends for London
(Over 16s only)



Source: ONS UK Time Use Survey 2000
http://www.statistics.gov.uk/TimeUse/summary_results/when_do_we_do.asp

This paper examines the economic implications for London of the move to SDST. In particular it focuses on the following areas: Road casualties, Crime , Energy efficiency, Health, Business activity, Finance and Business Services communications, Tourism and Leisure, and Transport.

It launches the results of a new survey of London businesses which reveals that **more than a third expect SDST to be good for their business versus just 8 per cent who fear a negative impact.**

Daylight saving in the UK

(i) A long history[3]

Consider two truisms and one fact.

First, that daylight is valuable. It is the time when we prefer to work, learn, travel and take much of our leisure. By happy coincidence it is more energy-efficient to do all these activities in daylight hours when there is less need for extra heat or light. At night time - during the hours of darkness - it makes sense to sleep.

Second, that we divide the day (the period from sunrise to sunrise) into subperiods. Just like milestones on a road, this makes our lives much easier. Artifacts from as long ago as

[3] For a fuller history see "Summer Time: In-depth investigation into the effects of summer time clock arrangements in the EU" (Research voor Beleid International for European Commission, DG VII, June 1999)

the Palaeolithic period suggest that the moon was used to calculate time as early as 12,000, and possibly even 30,000, years ago.

The fact: the earth is an oblate sphere therefore half of its surface always faces away from the sun; that half includes all the surface where it is night time.

Taken together, these two truisms and the fact mean that it cannot be the same time of day across the world.

Conceptually the times should change with every move westwards (time back) or eastwards (time forward), even by a single kilometre. For example the sun is at its highest point in Lowestoft – on the east coast of England – half an hour before it reaches its zenith at Lands End, the westernmost point of England. But this is obviously impractical. So it is the same time throughout the UK. Further: the world is divided into just 24 "time zones". With a handful of exceptions, it is the same time for all places inside a single time zone.

The imaginary lines separating the 24 time zones run from the North Pole to the South Pole. The first time zone begins at 0° longitude, or the 'prime meridian'. This imaginary line runs through Greenwich in London.

Until the mid-19th century all communities set their clocks to be consistent with local time. So people travelling west or east simply changed their timepieces when they entered a new town. That worked fine until in the 1840s local autarky began to collapse, with the development of the railway lines, the invention of the electric telegraph and the growth of inter-regional trade. It quickly became clear that to avoid chaos, one universally agreed time was needed in order – for example – to compile railway timetables and use the telegraph.

The frontrunner for the supplier of the universally agreed time was Greenwich Observatory, with its long record of accurate timekeeping for astronomers.

In 1880 GMT (that is, mean solar time at Greenwich) was adopted as the sole legal time standard for the United Kingdom. Then at the Washington Meridian Conference of 1884, GMT was accepted as the time standard for the entire world. This conference also established Universal Time, from which the international 24-hour time-zone system grew. In this, all zones refer back to GMT on the prime meridian. Today, GMT – with slight refinements to keep it in step with atomic clocks – is known as "Coordinated Universal Time" and still serves as the world's time standard.

ii) GMT and BST[4]

Since 1971 Great Britain has set its clocks at GMT in the winter months and GMT +1 (British Summer Time) in the summer. The concept of better aligning waking hours with the hours of daylight is not new. In 1784, Benjamin Franklin (the then American Minister to France) in a letter to the editors of the Journal of Paris wrote about the "the waste of candlelight and daylight". His main motive then was not (as it might be now) saving energy or prolonging daylight hours. Rather, he wanted to reduce the need for people to spend money on candles.

[4] This section draws on "British Summer Time", House of Commons Library Note SN/SC/3796 – Edward White, 23 October 2008

The innovation of daylight saving time (in 1907) is credited to British builder William Willett and New Zealander George Hudson, an entomologist. Willett noticed while riding his horse one morning that many blinds were still down. He realised recreation time in the evenings could be lengthened by the simple move of advancing the clock. In a pamphlet entitled "The Waste of Daylight" Willett proposed advancing the clock by eighty minutes in the summer. Although his idea was examined by Parliament in 1909, it was never adopted.

The 1908 Daylight Saving Bill was the first attempt to move the clocks forward in the summer. The rationale was threefold:

- to ensure extra daylight for the training of the Territorial Army and for recreation;
- to reduce the incidence of shunting accidents on the railways
- and to reduce expenditure on lighting.

However, the bill failed because of objections that the proposals would disrupt traffic with Europe, interfere with business transactions with the US, keep children up late and cause problems for farmers and the rest of the agricultural sector.

During the Great War (in 1916) Germany introduced daylight saving time, primarily in order to conserve energy for the war effort. This was followed by France, Portugal, Italy, Netherlands, Denmark, Norway, Sweden and Austria. This move meant that some of the arguments against adoption in the UK became redundant and the Summer Time Act (1916) moved the clocks forward in the UK in summer for the first time.

Since that time, the clocks have always been moved forward at the start of summer.

During World War Two (1939 – 1945) the clocks were moved forward twice a year (February and May) and back twice (August and November) in order to make maximum use of the daylight.

iii) Other time configurations

From 1968-71 the three year 'BST experiment' was carried out. This retained summer time throughout the year – in other words a halfway house to SDST, with the time in the winter the same as in continental Europe.[5] Despite popular approval (50 per cent versus 41 per cent) the experiment was abandoned after a vote in the House of Commons (366-81 on 2 December 1970). Reading the debate, this seems to have reflected concern about a rise in road traffic casualties even though the accident data indicated a net fall in casualties. It was alleged that this concern was fuelled by some newspapers publishing "lurid photographs of a few children injured on the way to school in the dark". The opposition was particularly strong in Scotland where 61 per cent favoured a return to GMT and only 34 per cent wanted to stay on BST. Opposition in the agricultural industry was also strong.

[5] In other words the clocks were not turned back in October 1968 and were not changed until October 1971.

iv) Subsequent proposals for SDST

Subsequent to the 'BST experiment' there have been eight attempts to legislate SDST. Four of these originated in the House of Lords, three in the House of Commons. Brief details are in Table 2.

Table 2: SDST: Legislative proposals

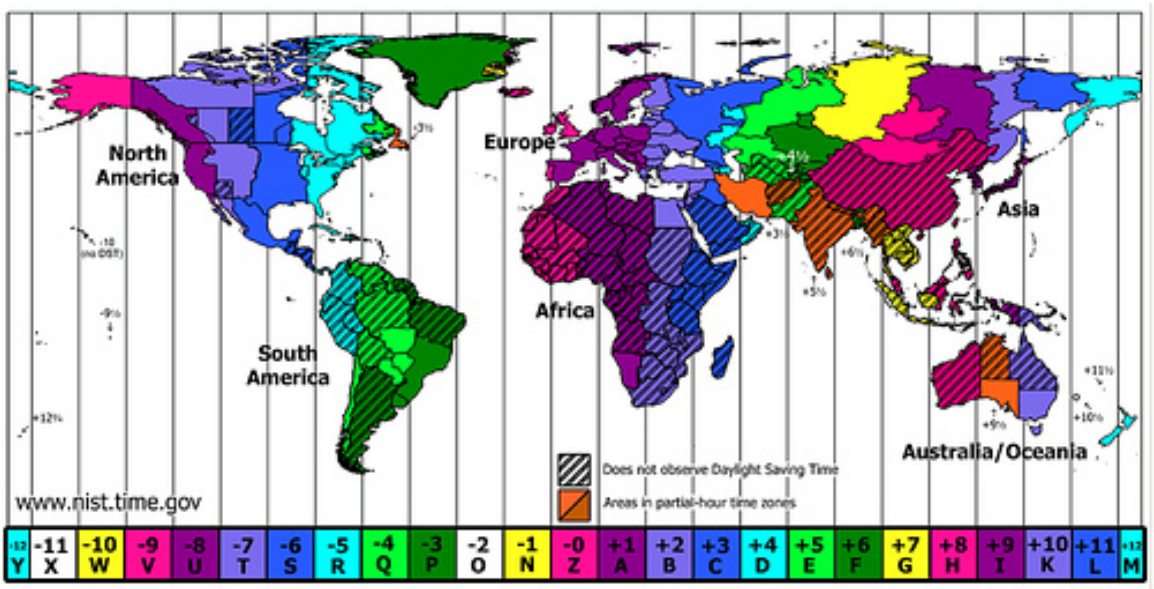
Date	Name	Originator	Details
2008	Westminster Hall debate	David Kidney MP	There was no vote.
2008	Energy Saving (Daylight) Bill	Tim Yeo MP	Ran out of time.
2006	Energy Saving (Daylight) Bill	Tim Yeo MP	Allowed separate votes in Scotland, Welsh assembly, N Ireland Assembly. Ran out of time.
2005	Lighter Evenings (Experiment) Bill	Lord Tanlaw	3 year experimental period, opt-outs for Scotland, N Ireland, Wales.
2004	Lighter Evenings Bill	Nigel Beard MP	Just England & Wales. Ran out of time.
1995	British Time (Extra Daylight) Bill	John Butterfill MP	Government supported (except Scottish Office) but only "passively". Scottish Office very hostile.
1995	Western European Time Bill	Viscount Montgomery	Failed in Commons.
1994	Central European Time Bill	Viscount Mountgarret	Excluded Scotland. Failed in House of Commons.

In June 1989 the Government published a Green Paper, "Summertime: A Consultation Document ". SDST was one of the options proposed. However there was strong opposition from Scotland and nothing more was done.

Daylight Savings Time elsewhere

Around 70 countries adopt Daylight Saving Time (DST) in at least part of the country. Japan, India, and China are the only major industrialised countries that do not have some form of daylight saving. China has had a single time zone since May 1, 1980. They had summer Daylight Saving Time from 1986 to 1991 but they do not have DST now. Equatorial and tropical countries (lower latitudes) generally do not observe Daylight Saving Time - since the daylight hours are similar throughout the year, there is no advantage to moving clocks forward during the summer. Figure 3 shows a map of countries by time zone highlighting those that observe DST.

Figure 3: Time zones by country



Source: www.nist.time.gov

Business opinion on SDST

In April 2010 the London Chamber of Commerce and Industry conducted a survey of 182 of its members, asking if SDST would be beneficial to their business. **The responses showed that more than a third of London firms (36 per cent) expected that a change to SDST would benefit their business, compared to just 8 per cent who feared a negative impact.** Fifty one per cent of businesses thought that there would be no difference and 5 per cent did not know.

Sixty out of the 65 companies signifying support for a change chose to list at least one reason why they thought that the change would be beneficial for their businesses. The most common benefit cited was improved overlap with customers, subsidiaries, partners and suppliers, with most specifying Europe by name. This benefit was mentioned unprompted by 38 out of the 60 cited. A couple of respondents also cited an increased overlap with Asia. The second most commonly cited reason for believing the change would be beneficial was staff morale, which was mentioned by 28 respondents. Several of those who mentioned morale felt that it would also boost productivity (with one even suggesting that staff would be willing to work later). Other positive reasons for change cited included environmental savings (mostly energy costs), and increased leisure spending, both of which were identified by five respondents. Four companies also mentioned improved safety.

However, the qualitative responses also underlined the need for greater explanation of the benefits to businesses. A number of respondents cited that the changes would align UK office hours more closely with those in the USA (when in fact, the UK will lose an hour of overlap with North America) and some respondents said that the confusion caused by changing the clocks twice a year would be done away with (under the changes the clocks will still be changed twice a year).

Of the 14 companies that were negative about the changes, nine stated that they were concerned with darkness (with most citing darker mornings in winter). Five said they

were happy with the status quo and saw no reason to change. Only one of the 14 mentioned the historic issue of the safety of children in the mornings. Interestingly, one of the positive respondents said that the changes would improve safety for children.

For a breakdown by company size, sector and location please see appendix.

Public opinion on SDST

In October 2005 the results were published of a MORI opinion poll commissioned by the Mayor asking members of the public their views on a move to SDST.[6] The balance against moving to SDST was 9 per cent in London and 11 per cent in Scotland. Of those who approved, 56 per cent in London cited as a reason "bring us into line with Europe".[7]

When respondents were asked whether the number of road casualties would rise if the clocks were changed to give an hour extra light in the evening, 19 per cent in London said 'yes' and 29 per cent in Scotland. The proportions saying that they would expect 'fewer' were 15 per cent and 13 per cent respectively.

The numbers supporting SDST were 38 per cent both in London and in Scotland. Opposed were 49 per cent/46 per cent respectively.

However, when the same respondents were told about research by the Transport Research Laboratory that estimates that road casualties would fall if SDST was adopted, the approval rate for SDST was as high as 76 per cent in London and 71 per cent in Scotland. Only 15 per cent in London and 21 per cent in Scotland disapproved. The polling suggests that the road casualty myth which led to the 1970s experiment being abandoned lives on.

London Assembly view on SDST

The London Assembly has 25 Members who are elected at the same time as the Mayor. 14 are elected by constituencies and 11 London-wide. The Assembly holds the Mayor to account by examining his decisions and actions. Members also represent their constituents, if necessary investigating important issues and pressing for changes to national, mayoral or local policy.

At its plenary meeting on 22 March 2006, the London Assembly agreed the following motion[8]:

> The Assembly believes that Londoners like most of Britain, would benefit from a permanent change of the clocks to single/double British summer time, thus providing extra daylight at the time of day when most Londoners would find it of extra use. This is supported by the Royal Society for the Prevention of Accidents (RoSPA) and the Metropolitan Police, who believe such a measure would cut road accidents and crime levels. However, this Assembly also notes that such a move could have detrimental effect in other parts of Britain and on parts of London's economy, and therefore calls on officers to carry out further

[6] 1000 Londoners were polled along with 500 Scots.
[7] legacy.london.gov.uk/assembly/assemmtgs/2006/mqtdec13/item11a.pdf
[8] legacy.london.gov.uk/assembly/assemmtgs/2006/mqtdec13/item11a.pdf

detailed scrutiny work on this important issue and place this on a future Assembly agenda for discussion.

A report to the Assembly (which can be found through the URL already cited) then examined some of the main arguments for and against a move to SDST.

Transition costs and disruption

If a decision was made to move to SDST all that would be needed would be to cancel the changing of the clocks (an hour back) at the end of October in the first year. That will set the time as GMT+1 for the winter months. The clocks would go forward an hour in Spring as normal, taking the time in summer to GMT+2. The clocks would go back an hour the following October to GMT+1 again. Therefore in theory there should be few transition costs from moving to SDST. However any change from the status quo will involve transitional issues - for example for transport timetables - that would normally change in October.

If there was evidence that the very act of putting the clocks back in October has an impact on traffic casualties then **not** putting them back might result in a 'transition impact'. But the evidence is inconclusive. See for example the article in the New England Journal of Medicine.[9]

Indeed one might expect the evidence to be inconclusive since there are arguments both ways. On the one hand, the extra hour of sleep should help to reduce casualties since drivers will be more rested. But against that, the sudden onset of darkness an hour earlier in the evening disorientates drivers and makes casualties more likely.

Road casualties

(i) SDST should reduce incidence of road casualties

It is both intuitive and a well documented fact that road collision risks are greater in darkness than in daylight as a result of reduced visibility. There have been a number of studies of the impact on road casualties of moving to SDST.[10] These conclude that overall there would be fewer casualties but with a change in the time of day as to when these casualties may occur. A small rise in casualties in the morning rush-hour in the darker mornings would be **far outweighed** by the fall in the evening rush-hour when it would be lighter. This is because road users are more tired in the evening and also because some journeys are less direct in the evening, with for example children taking a detour to the houses of friends, or to shops or places of entertainment.

The London Road Safety Plan (2001)[11] identifies the UK's clock regime as a determinant of road collisions and casualties that has particular relevance for London. This is because London's relatively low level of car ownership makes walking especially important, and pedestrians are vulnerable road users because they have relatively high numbers of collisions and are more likely than others to suffer serious or fatal injuries.

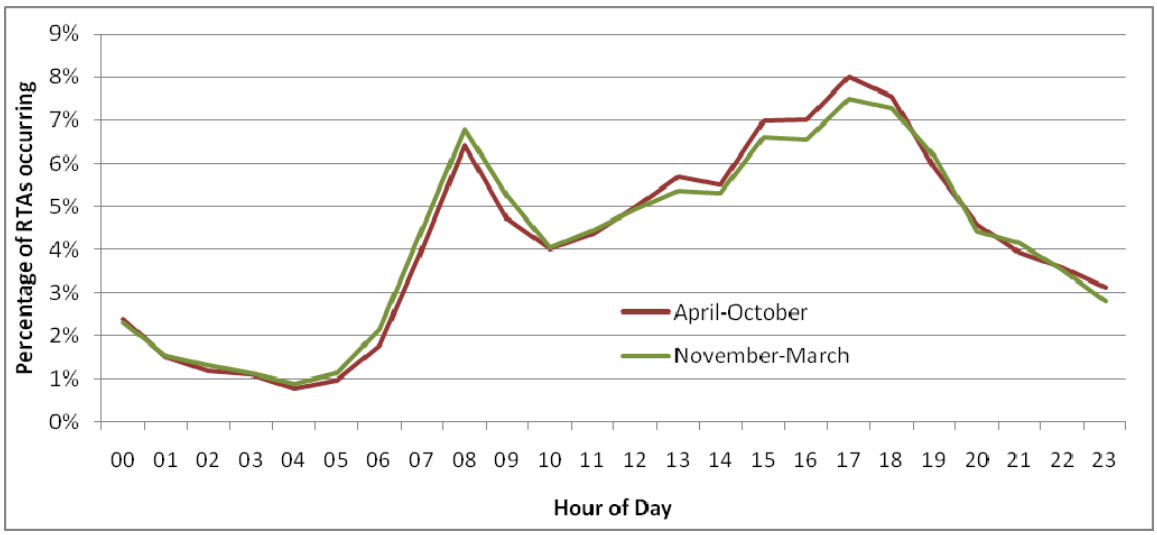
A 2009 Department for Transport study suggested that the cost-benefit case for SDST as regards a net reduction in road casualties is clear, projecting a net present value of

[9] http://content.nejm.org/cgi/content/extract/339/16/1167
[10] Eg http://www.dft.gov.uk/consultations/archive/2009/roadsafetyconsultation/roadsafetyconsultation.pdf
[11] London's Road Safety Plan, November 2001, Department for Transport.

£1,378.6 million over 10 years, including a media campaign of £5 million.[12] Non-monetised costs identified in the study are: "cost to agriculture and building industries of darker mornings, darker mornings in northern parts of Britain." Non-monetised benefits are "energy savings from lighter evenings, more opportunities for sport and leisure, benefit to business community of being aligned with other western European nations."

A 1993 report of the Policy Studies Institute[13] reported that in Great Britain during the four winter months (November to February) there are more than 50 per cent more fatal and serious injuries among adults in the 4pm-7pm peak as between 7am to 10am. Furthermore there are nearly three times as many fatal and serious injuries among children between 3pm to 6pm as from 7am to 10am. As Figure 4 shows, the incidence of road casualties in London is higher during the evening peak than the morning peak. There is very little difference between the summer and winter months.

Figure 4: Road traffic accidents by time of day (London; April 2007 - March 2010)



Source: London Ambulance Service, GLA Strategic Crime Analysis

The Royal Society for the Prevention of Accidents (RoSPA) voiced strong support for the Energy Saving (Daylight) Bill 2006.

(ii) Quantifying the benefit to London of casualty reduction

Some studies of the impact of SDST on road casualties use the data from the 1969-1971 experiment. However this is not very satisfactory for two reasons. First, there have been many legislative changes since that time which have impacted on the incidence of casualties[14]. Some far-reaching changes were still having an impact during

12 http://www.dft.gov.uk/consultations/archive/2009/roadsafetyconsultation/roadsafetyconsultation.pdf- see p106

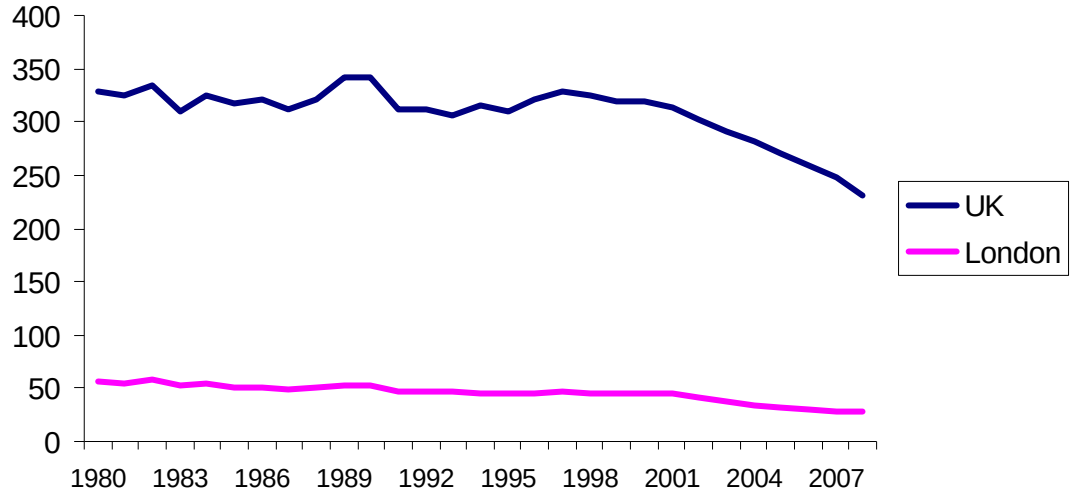
13 M Hillman, Time for change Setting clocks forward by One Hour Throughout the Year – A new review of the Evidence, Policy Studies Institute, 1993 ; by the same author and also published by the PSI, 1987 "Putting the clocks forward by one hour" and 1988 "Making the most of the Daylight Hours".

14 For a chronology of events affecting road safety and traffic, see http://www.dft.gov.uk/adobepdf/162469/221412/221549/227755/rrcgb2009.pdf Reported Road Casualties: Annual Report, 2009

the experiment, for example, in 1967 it became compulsory to fit seat belts on all new cars; the drink-driving law was introduced; and the 70mph speed limit was introduced.[15]

Second, the numbers killed or injured in road collisions has fallen dramatically in recent years. Between 1971 and 2007, the number of people killed and injured in road collisions fell by 30 per cent nationwide and as much as 49 per cent in London.

Figure 5: Numbers killed and injured (all severities) in road accidents per annum ('000s)



Source: Department of Transport

To estimate the possible fall in casualties in London if SDST were introduced, therefore, we use some research that does not depend entirely on the 1969 experiment. A Transport Research Laboratory Report in 1998,[16] commissioned by Department of Transport used trigonometrical equations to calculate the altitude of the sun at any date and time for any point in the UK. This allowed the light level at the time of any accident to be represented by the altitude of the sun and added to the data for the accident. The effects of darkness was found to be greater for pedestrians than for vehicle occupants, and greater for fatalities than for non-fatal casualties.

The study estimated that the number of deaths (averaged over 1991-1994) would fall by 104 and 138 per annum (depending on the assumptions made) had SDST been in place. This represented a fall of between 2.6 per cent and 3.4 per cent in deaths. The impact on 'serious injuries' is estimated at 339 annually, representing a fall of 0.7 per cent. (There is no estimate of the impact of SDST on 'slight injuries').

[15] Other changes include: In 1973/4 it became compulsory for motor cyclists to wear helmets; in 1982 the driving test for motorcyclists became tougher; in 1983 seat belt wearing became compulsory for drivers and front seat passengers and road humps began to be introduced; in 1989 it became compulsory for children in the backs of cars to wear seatbelts.

[16] J Broughton and M Stone, 'A New Assessment of the likely effects on road accidents of adopting SDST', TRL, 1998

To update this study we first compare the number of deaths nationwide in 2008 (2,538) with the average for 1991-4 (4,065). We then calculate 3 per cent of 2,538 (being the average of 2.6 and 3.4 per cent). This suggests a reduction of 76 deaths in 2008, nationwide. In 2008 London accounted for 8.1 per cent of deaths in road traffic accidents in the UK. So we assign 8.1 per cent of the hypothecated reduction in deaths to London, which results in a reduction of 6 deaths.

Turning to severe injuries due to road accidents, in 2008 there were 26,034 severe injuries nationwide and in 1991-4 there were on average 48,109. We then calculate 0.7 per cent of 26,034. This suggests a reduction of 182 severe injuries in 2007, nationwide. In 2008 London accounted for 12.8 per cent of severe injuries in road traffic accidents in the UK. So we assign 12.8 per cent of the hypothecated reduction in severe injuries to London, which results in a reduction of 23 severely injured road accident victims.

To attach a value to these changes, we use the Department of Transport's Transport Analysis Guidance.[17] This assigns values to casualties, for the purposes of deciding on measures to prevent them, as follows:

Table 3: Costs of road casualties

£ June 2007

Injury severity	Lost Output	Human costs	Medical and ambulance	Total
Fatal	556,660	1,080,760	970	1,638,390
Serious	21,830	150,180	13,230	185,220
Slight	2,310	10,990	980	14,280
Average, all casualties	11,200	39,300	2,350	52,850

On this basis the value of SDST in preventing 6 deaths and 23 injuries in London would be £14.1 million (2008 at 2007 prices).

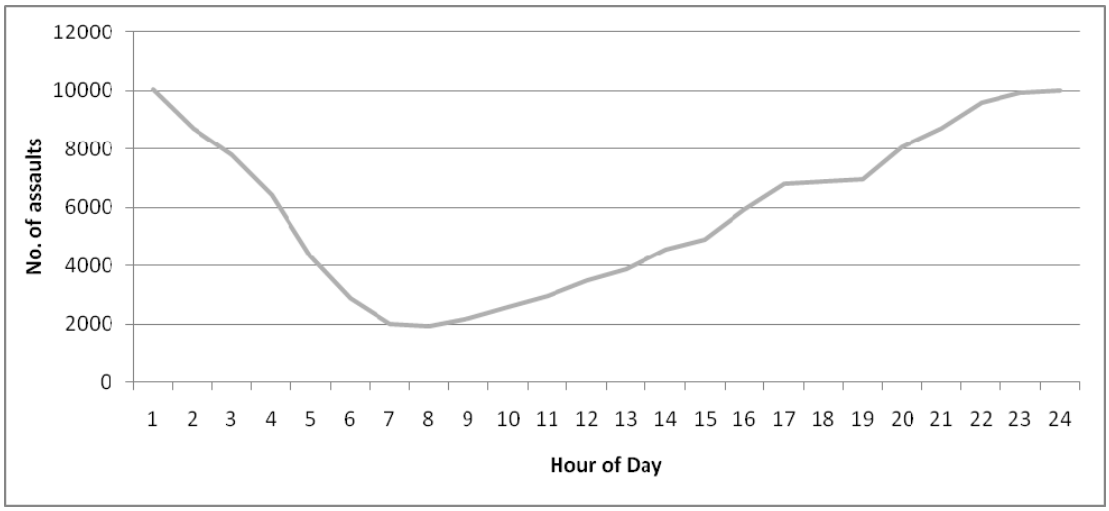
Crime

Recent British Crime Surveys have shown that over half of criminal offences take place when it is dark in the late afternoon or evening.[18] However, this does not imply a causal link. Indeed it is very difficult to establish a causal link between daylight hours and crime. Certain crimes are facilitated by darkness, while other crimes are more associated with daylight.

We do not know the precise time when most house burglaries are committed, of course. But we do know about crimes of the person – that is, assaults. They are significantly more common in the evening than in the morning, as shown in Figure 6. Between the hours of 7 and 11 in the evening there are three times as many assaults in London as between 7 and 11 in the morning.

[17] http://www.dft.gov.uk/webtag/documents/expert/unit3.4.php#02
[18] BBC What else happens when clocks go forward? BBC News 27 March 2006

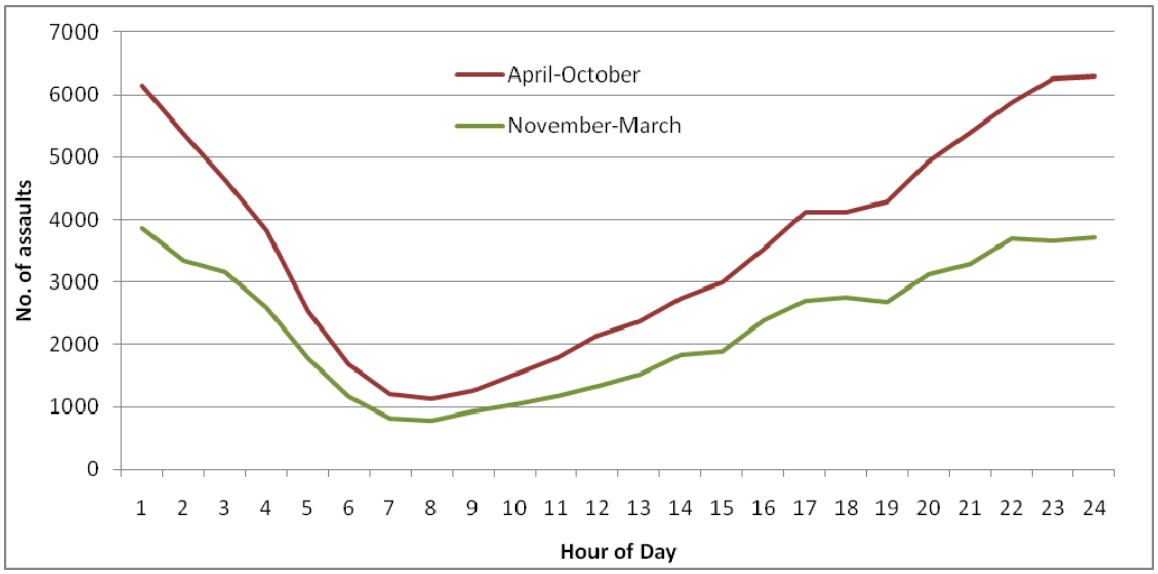
Figure 6: Assaults in London by hour of day, April 2007- March 2010



Source: GLA Strategic Crime Analysis

Figure 7 shows that more assaults are reported at all times of the day during the summer than in the winter months.

Figure 7: Assaults in London by hour of day and split by summer and winter



Source: GLA Strategic Crime Analysis

This may reflect the increased opportunity for crime to take place since more people are out and about more often and for longer periods of time given the longer daylight hours and warmer temperatures. There is little doubt that the chances of a criminal getting caught are less in the dark than in the light. Hence moving to SDST should act as a deterrent in the evenings.

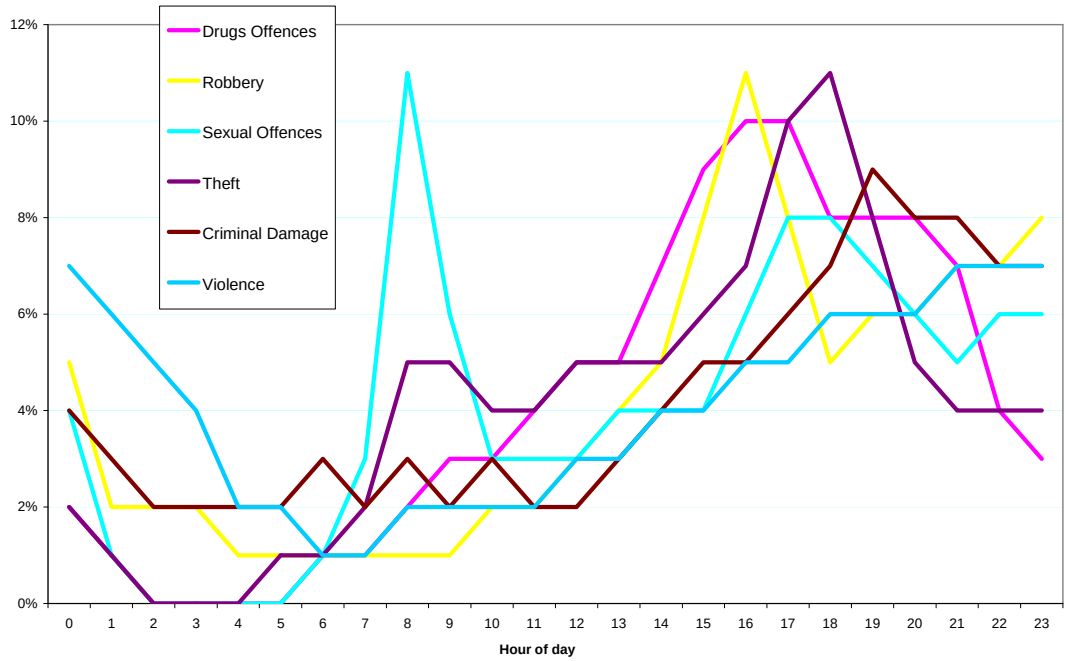
Crimes which are more likely to take place in the dark such as assaults, vehicle theft and burglary may decrease if we had more daylight in the evenings as opposed to the mornings. However the flip side of this is that crimes more associated with daylight –

such as theft from the person - might rise. Nonetheless it is unlikely that crime would shift to the morning, since few serious crimes are reported in the morning.

Offences occurring in conditions of semi-darkness are far more likely to occur at dusk rather than dawn, suggesting that lighter evenings reduce the risk of crime rather than lighter mornings.[19]

Figure 8 plots the crime data for hour of day calculated as a percentage of the total for each crime type – i.e. making each offence type relative to one another.

Figure 8: Crime by hour of day



Source: GLA Crime & Public Safety Analysis Team

Figure 8 shows that most crimes do peak in the afternoon/evening. The sharp peak for sexual offences in the morning most likely reflects the reporting of the crime rather than when the crime took place. The same is also likely to be true for other crime types such as theft for example.

Fear of crime is most certainly linked to daylight. Fear of street crime has made some people reluctant to go out after dark, particularly vulnerable groups such as older people and younger women. Indeed Age Concern England supports SDST because lighter evenings would mean that older people could spend more time out of their homes if they choose to do so.[20] Many parents do not allow their children to go out after dark. Therefore the adoption of SDST would give an extra hour of daylight in the evenings having an impact on activities after school for example. Outdoor activities are often limited by the length of daylight.

The Police Federation is in favour of a move to SDST.

[19] BBC What else happens when clocks go forward? BBC News 27 March 2006
[20] Guardian.co.uk, "British Summertime – it's time for a rational change" 26 March 2010.

Energy efficiency

Changing the clocks can lead to changes in energy usage. Imagine if we all slept during daylight hours and worked, learned and had leisure time during the hours of darkness. Not only is energy needed to create light, but the air temperature is on average colder in the dark, so more energy is needed to create heat as well.

As explained, SDST is a way of better aligning the hours of human activity to the hours of light. It must therefore save energy – the challenge is to try to quantify the saving, and the associated saving in CO_2 production.

Estimating the savings is beyond the scope of this paper. In particular, there are nonlinearities involved. In high summer, for example, the fact that the clocks are an hour ahead is not going to make much difference to energy consumption, because it is light for so much of the day anyway. But in – say – March, it will make a difference.

Fortunately there are academics who have estimated the savings, including by the use of nonlinear methods. The most recent of these studies is in a journal called Energy Policy.[21] The authors found that advancing the time by an hour in winter would lead to energy savings of at least 0.3 per cent of daily demand in Great Britain. The problem with calculating a similar figure for the summer months is that there is no precedent: the GMT+2 regime has not been adopted since World War Two when it was aimed at saving fuel. However it might be reasonable to expect 0.2 per cent of savings, making perhaps 0.25 per cent taking the year as a whole. Corresponding savings in cost were found by the authors to be 0.6 per cent for the winter months – perhaps 0.4 per cent over the year as a whole. The environmental impact was found to be 450,000 tonnes of CO_2 in the winter months so maybe 600,000 tonnes in a full year.

These numbers imply a saving in costs for London domestic and commercial energy users of some £20 million a year. The environmental impact would be around 80,000 tonnes of CO_2 per year.

Health

Moving to SDST would increase opportunities for exposure to daylight and sunlight which would encourage outdoor activity and promote fitness. This in turn could lead to improved health and could potentially lead to a reduction in cases of Seasonal Affective Disorder (SAD) - a form of depression resulting from lack of sunlight which is thought to affect about 1 per cent of the population.[22]

Access to sunlight also has health and well-being benefits through the endogenous production of Vitamin D, this is particularly important for pregnant women and children.

The extra hour of daylight may increase the number of children that walk home from school which would have health benefits by reducing obesity. There would also be reduced environmental costs for those trips that switch from car to walking. Over the past 20 years we have seen the proportion of trips made to and from school shift to car from walking. Less than 50 per cent of trips are made by walking, having fallen from

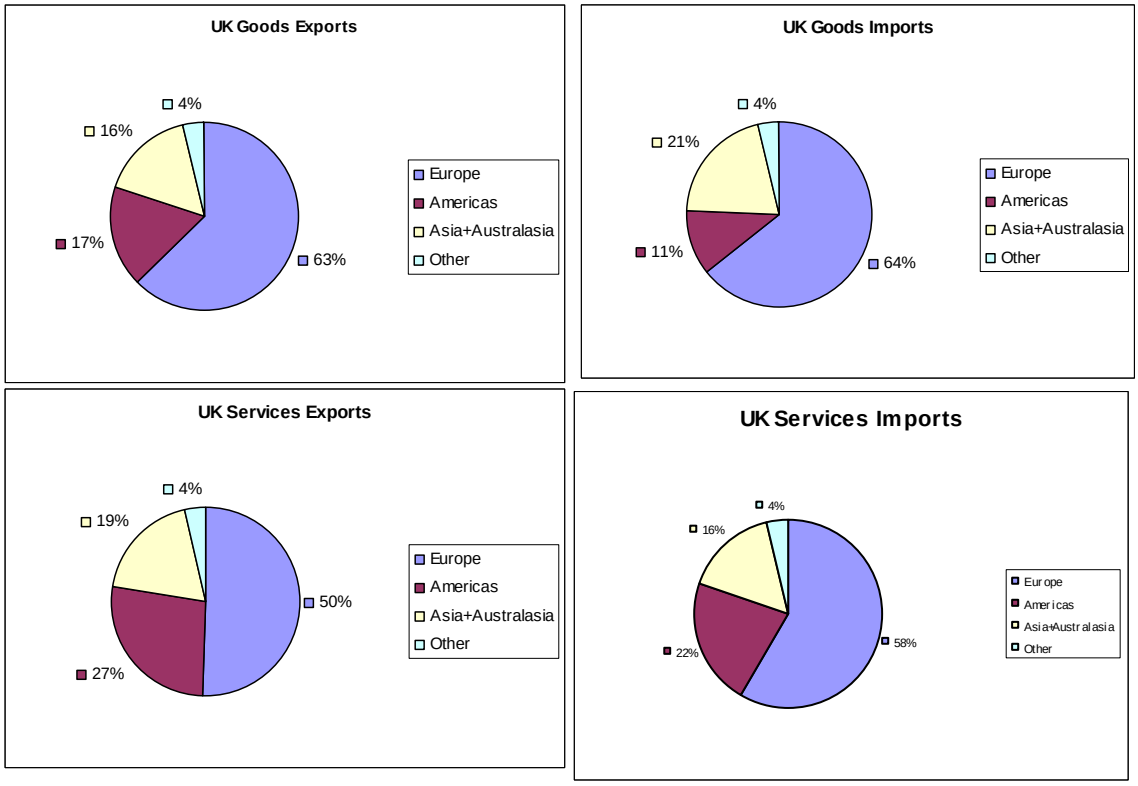
[21] S.I. Hill, F.Desobry, E.W.Garnsey, Y.-F.Chong, (2010), The impact on energy consumption of daylight saving clock changes', Energy Policy 38/9, 4955-4965.
[22] M Hillman, Time for change Setting clocks forward by One Hour Throughout the Year – A new review of the Evidence, Policy Studies Institute, 1993

above 60 per cent at the end of the 1980s.[23] The British Medical Association backs the adoption of SDST.

Business activity

Figure 9 shows UK imports and exports of both goods and services.

Figure 9: UK Trade



Source: United Kingdom Balance of Payments, – Pink Book , ONS, 2009

The message from the charts is clear. Whether it is exports or imports that are the focus, or whether it is goods trade or services, the UK's main trading partner is Europe and not the US or Japan or China. Multinational companies commonly have a European hub, an Asian hub and a US hub. Typically the European Head Office is responsible for the European regional offices and not for Asian or US offices. If the European Head Office is in London, it is therefore much more important for its working day to overlap with the rest of Europe than with Asia or North America.

If the UK moved to SDST then the overlap with Asia in the morning would increase while that with North America in the afternoon would diminish (the opening of the New York stock exchange would move to 3pm London time).

This also affects business travel. UK businessmen make 8-9 times more business trips to Europe than to North America.[24] A move to SDST would help business travel and

[23] National Travel Survey, Department for Transport.
[24] Reinke 1999, Summer Time In-depth investigation into the effects of summer time clock arrangements in the European Union, Leiden June 1999

communications with European partners, customers and suppliers and could therefore boost trade.

Financial and Business Services communication

Bringing the UK into line with SDST would improve communication with the rest of the EU since more of the working day would overlap. At present a 9-5 working day in the UK and Paris/Frankfurt only overlaps by 5 hours (assuming a one hour lunch break from 13:00-14:00 in both the UK and Paris/Frankfurt). Aligning the time would raise this to 7 hours or by 40 per cent.[25] For items of services trade that rely on 'real time' two-way voice or video communication, that would be a major benefit. An example would be a London-based fund manager who is advising a Swiss client, or a London-based lawyer who is advising a French company on an acquisition, or a London-based actuary who is advising a Dutch pension fund.

It would also make it considerably easier for London-based workers to be present at meetings in Europe without needing to stay overnight. Take for example Paris. At present to make an 11am meeting in central Paris requires a waking time of maybe 4:00 (to catch the 05:25 Eurostar, arriving at 8:50 in central Paris) or a waking time of 5:30 (to catch the 06:55 train, arriving at 10:17 in central Paris). The first Paris flight from a London airport departs at 06:40.

London's financial services industry (which accounts for around 15 per cent of London's output and 7 per cent of its employment) would be a major beneficiary.

The overlap with Asia in London's morning time would also increase by an hour: at present someone who works for the branch of an Australian bank in London who calls his/her head office in Sydney at 8am on a Monday morning would most likely not get an answer (it would be 7pm on Monday evening there). If SDST was adopted, it would be 6pm instead, giving more chance of the phone being answered.

The London afternoon overlap with New York would be reduced by an hour. Currently the overlap is from around 2pm London time to 6pm; this would move to 3pm to 6pm. However this loss would be small, set against the gains to the Europe and Asia overlaps.

Tourism and leisure

London is the most popular tourist destination in the UK. ONS data on the regional contribution of tourism (latest data is for 2006) reveals that tourism contributed £8.3 billion to London's economy, or 3.4 per cent of total GVA.[26] In absolute terms, its contribution in 2010 was almost certainly higher. Tourism employs some 260,000 people in London (5.4 per cent of total employment)[27] and this will of course grow as the 2012 Olympics approaches.

In 2008 London's tourist industry accounted for half of all overseas visitor spending in the UK (though only 10 per cent of domestic tourist spending, because stays of foreign visitors are much longer). Eighty per cent of London's tourism earnings represented spending by visitors from abroad.

[25] The 9-5 numbers are illustrative; if say 8-6 was used for both the UK and Paris/Frankfurt then the gain in overlap time from SDST would be 29 per cent (from 7 hours to 9 hours).
[26] The Economic impact of tourism across regions and nations of the UK , ONS May 2010
[27] ABI, data is for 2007.

It is clear that changing the clocks to an hour ahead by introducing SDST will have a strong beneficial impact on the tourism and leisure industries. Sports events in the open air in venues without floodlights will be able to finish an hour later; active participants in sports will have an hour longer to play them; parks and major attractions such as London Zoo will be able to stay open an hour longer; and the exteriors of London's historic buildings will be visible for an hour longer in the evening, when tourists can view them, rather than in the morning when they are not out and active. Even for events which are not dependent on daylight, tourists prefer to travel in the light and the air temperature also drops at dusk.

The most popular outdoor pastime is gardening and lighter evenings would give more time for this. Half of the most popular adult participation sports are dependent on daylight.

The Culture, Media and Sport Committee in its report in July 2008 stated "there is a growing body of convincing evidence demonstrating the benefits of the proposal, not least in terms of energy savings, road safety and increased tourism revenue…".[28]

The British Tourist Authority has suggested that a change to CET (which is SDST by another name) might boost tourism by over £1 billion across Britain.[29] A Policy Studies Institute study estimates the likely benefits to tourist activity in the UK to be even higher including a boost to overall tourism earnings of an estimated £3 billion, and an increase in employment of between 60,000 and 80,000.[30] Given that London accounts for 21 per cent of overall UK GVA and around 24 per cent in the tourism economy, we can expect a boost of somewhere between **£240 and £720 million (2006 prices).**

The Tourism Alliance has a 'campaign for daylight saving' (for a three year trial period) which is supported *inter alia* by: Age Concern, British Hospitality Association, Local Government Association, National Association of Head Teachers, ROSPA, the AA, Tourism Alliance, Visit Britain. The British Association of Leisure Parks, Piers and Attractions (BALPPA) is also a strong supporter.

Transport

We have already seen how SDST would make it easier for London-based travellers to attend morning meetings in Europe without needing to stay overnight and how it would extend the working day overlap with Europe of UK-based workers by possibly as much as 40 per cent.

For long haul flights from westbound (eg from the USA), passengers will be able to take off an hour earlier without violating the prohibition on early morning landings at eg Heathrow. For long haul flights eastbound, the benefit of SDST to UK travellers is that they will arrive in (say) the Far East an hour earlier.

For airlines and for travel companies in general, the move to SDST – the same time as most of Europe – will be of great benefit to scheduling, more than compensating for

[28] House of Commons Culture, Media and Sport Committee Tourism Report Eighth Report of Session 2007–08
[29] Gaurdian.co.uk, " British Summertime – its time for a rational change", 26 March 2010
[30] Dr Mayer Hillman, 'The Likely Impact on Tourist Activity in the UK of the Adoption of DST', Policy Studies Institute, Oct 2008

the one-off cost of rescheduling. The development of UK airports as 'hubs' for those who live in Continental Europe will be made much easier.

For the logistics industry, harmonisation with CET would simplify the administration of businesses. Ferry or courier companies for example would no longer need to worry about time differences and would have a two hour increase in the overlap with Europe during the working day.

SDST and Scotland

Scotland's northerly position means that in the winter months, sunrise is already later than in England. See Table 4. A move to SDST would make it later still.

Table 4: Time of sunrise, sunset and length of day

Location	Longest Day (Summer Equinox 21st June 2010)			Shortest Day (Winter Equinox 21st Dec 2009)		
	Sunrise	Sunset	Length of Day	Sunrise	Sunset	Length of Day
Glasgow	04:31	22:06	17h 35m 16s	08:46	15:44	6h 58m 38s
Birmingham	04:44	21:34	16h 49m 56s	08:16	15:55	7h 39m 12s
London	04:43	21:21	16h 38m 22s	08:04	15:53	7hr 49m 41s
Cardiff	04:56	21:34	16h 38m 00s	08:16	16:06	7h 50m 02s

Source: www.timeanddate.com

This explains why initiatives to change the clocks to produce lighter evenings have often foundered on "the Scottish question". That was true for example of the 1968-71 experiment. In particular, the erroneous view gained currency (fuelled by some sections of the Scottish media) that the incidence of road casualties would rise if the clocks were advanced. Also hostile responses from Scotland to the 1989 Green Paper option of SDST effectively closed off the option.

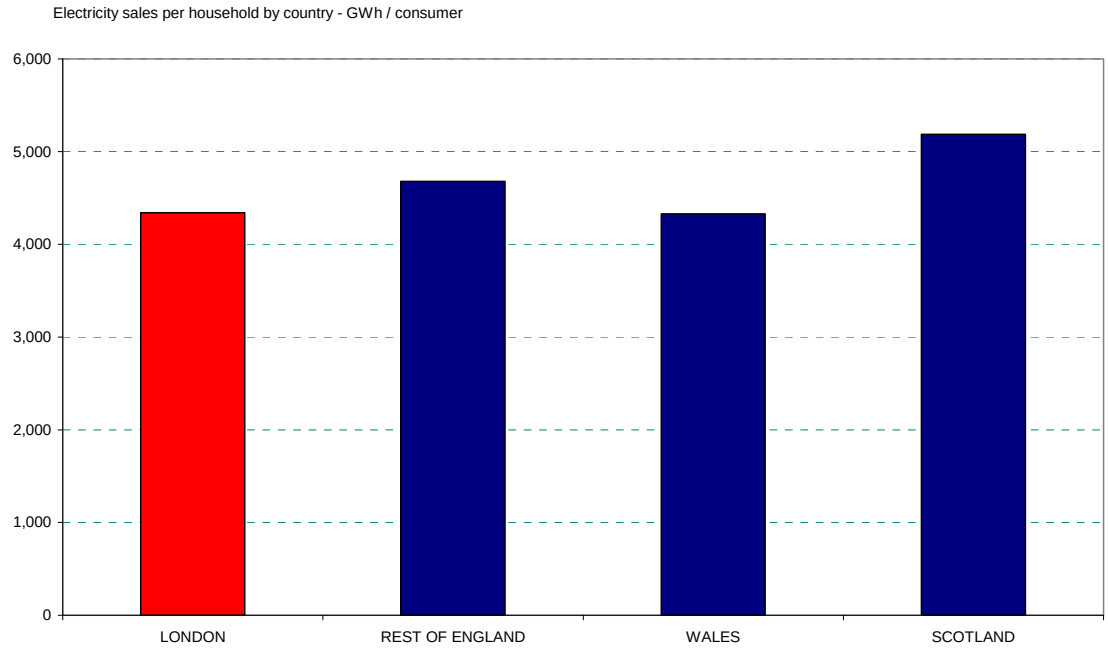
However, this argument against SDST is invalid. Road casualties would be reduced in Scotland by the move - just as they would everywhere - and Scotland would share fully in all the other benefits of SDST.

If the Westminster Parliament accepted SDST but the Scottish Parliament did not, it is possible that legislative provision could be made for Scotland to have its own time. Another option would be for Scotland to change to SDST but adjust working hours and school hours. This after all is what happens in some parts of Scandinavia.[31]

Note that the benefits of SDST could possibly be even greater in Scotland than in England. Compared with elsewhere in the UK, Scotland is a relatively heavy user of electricity (see Figure 10) and the move offers energy savings.

[31] "Daylight Saving in GB: the Case for Institutional Innovation" Brendan Cronin and Elizabeth Garnsey, 2007: page 2

Figure 10: Electricity sales per household



Source: Department of Energy and Climate Change

Also, the evening peak for road traffic casualties is longer in Scotland[32] so there is the potential for proportionately more lives to be saved (and less injuries) on the roads in Scotland than elsewhere in the UK.

Conclusion

This research shows a strong case for a move to Single Double Summer Time as far as London is concerned. Likely benefits can be quantified for a reduction in road casualties and in energy use and CO_2 emissions as well as for a boost to tourism. Benefits in other areas – health, reduced fear of crime, business activity, communications, transport – are less amenable to quantification but could be considerable.

[32] Tom Mullarky , Chief Executive of RoSPA speaking at the launch of the 1010 Lighter Later campaign on 21 June 2010

Appendix – LCCI London Business Leaders Panel Survey

RESULTS IN FULL

Question: GLA Economics is undertaking a study of the implications for London of the UK moving the clocks forward an extra hour throughout the year (meaning that the time in London would be the same as – for example – Paris). This would give an hour extra of light in the evening but an hour less in the morning. Do you believe that such a change would be beneficial to your business?

	Count	**per cent**
Yes	65	**36%**
No	14	**8%**
It would make no difference	93	**51%**
Don't know	10	**5%**
Total	182	**100%**

Results – by size of business

	Employees			
	1-19	**20-199**	**200-499**	**500+**
Yes	37%	42%	14%	20%
No	8%	8%	0%	7%
It would make no difference	49%	47%	86%	67%
Don't know	6%	3%	0%	7%
Total	100%	100%	100%	101%*

**Due to rounding up to nearest whole number*

Results – by sector

	Financial & Business Services	**Retail & Wholesale**	**Manufacturing, Transport & Logistics**	**Professions**	**Other Services**
Yes	38%	29%	39%	33%	35%
No	10%	6%	13%	3%	6%
It would make no difference	48%	59%	45%	61%	51%
Don't know	4%	6%	3%	63%	8%
Total	100%	100%	100%	100%	100%

Results – by location

	Inner London	**Outer London**
Yes	41%	34%
No	7%	7%
It would make no difference	50%	53%
Don't know	2%	6%
Total	100%	100%

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Chinese

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Vietnamese

Nếu bạn muốn có văn bản tài liệu
này bằng ngôn ngữ của mình, hãy
liên hệ theo số điện thoại hoặc địa
chỉ dưới đây.

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος εγγράφου στη δική σας γλώσσα, παρακαλείστε να επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυδρομικά στην παρακάτω διεύθυνση.

Turkish

Bu belgenin kendi dilinizde
hazırlanmış bir nüshasını
edinmek için, lütfen aşağıdaki
telefon numarasını arayınız
veya adrese başvurunuz.

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Hindi

यदि आप इस दस्तावेज की प्रति अपनी
भाषा में चाहते हैं, तो कृपया निम्नलिखित
नंबर पर फोन करें अथवा नीचे दिये गये
पते पर संपर्क करें

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি
(কপি) চান, তা হলে নীচের ফোন্ নম্বরে
বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں
چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر
پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى
الاتصال برقم الهاتف أو مراسلة العنوان
أدناه

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં
જોઈતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર
ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

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