Time to Change the Clocks

Arguing the case for moving our clocks forward

By Tobias Ellwood MP
November 2010
## Contents

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foreword</strong></td>
<td>1</td>
</tr>
<tr>
<td>1 Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>2 The Big Idea</td>
<td>4</td>
</tr>
<tr>
<td>3 Impact on the UK</td>
<td>6</td>
</tr>
<tr>
<td>4 Safer Roads</td>
<td>9</td>
</tr>
<tr>
<td>5 Reduction in Crime</td>
<td>11</td>
</tr>
<tr>
<td>6 Schools, Health and Well-being</td>
<td>12</td>
</tr>
<tr>
<td>7 Tourism and Leisure</td>
<td>16</td>
</tr>
<tr>
<td>8 Lower Energy and $\text{CO}_2$ Emissions</td>
<td>19</td>
</tr>
<tr>
<td>9 Business and Overseas Trade</td>
<td>23</td>
</tr>
<tr>
<td>10 Conclusion</td>
<td>25</td>
</tr>
<tr>
<td><strong>Acknowledgments</strong></td>
<td>26</td>
</tr>
<tr>
<td>Annex 1 Sunrise and Sunset Tables for England</td>
<td>27</td>
</tr>
<tr>
<td>Annex 2 Sunrise and Sunset Tables for Scotland</td>
<td>30</td>
</tr>
<tr>
<td>Annex 3 Sunset and Sunrise Table for Northern Ireland</td>
<td>33</td>
</tr>
<tr>
<td>Annex 4 History of UK Time Setting</td>
<td>34</td>
</tr>
<tr>
<td>About Tobias Ellwood MP</td>
<td>37</td>
</tr>
</tbody>
</table>
Foreword by John Lewis

We have justified it before and now with the arguments more powerful than ever, it is time to try again.

During the Second World War we moved our clocks forward to save electricity and accommodate more working time in the daylight. They were subsequently moved back and there they have remained, other than during a trial period between 1968 and 1971.

This last experiment did not last long and despite evidence presented by Reginald Maudling, the then Home Secretary, of improved safety and supportive polling, the farming lobby succeeded in keeping the status quo.

Britain is very different today: advances in farming technology have removed the farming lobby’s reasons to oppose change. This thought-provoking paper, authored by Tobias Ellwood MP, summarises the potential benefits that clock change would have across Government departmental briefs.

The political reluctance to introduce this change has largely focused on the supposed disadvantage it would bring to Scotland. However the recent publication “Putting Clocks One Hour Ahead -The Implications for Scotland” by Dr Mayer Hillman of the Policy Studies Institute, lays to rest any claim that Scotland would not benefit as much as the rest of the UK. Furthermore, the most recent polls both in Scotland and England show a majority in favour of the change.

After much debate it is time for Parliament to literally seize the day.
1. Executive Summary

The principal argument for considering time change is simple: how can we best align our lives to maximise the benefits of daylight.

While most people rise after sunrise and stay awake long after sunset we will continue to waste this free commodity. Fresh evidence and growing support now means the impetus for change is more powerful than ever.

Lifestyles, technologies, industries, interests and priorities have changed fundamentally since the last experiment when daylight saving took place in the 1970s. The majority of objections have now died away or, as in the case of the Scottish National Farmers Union, adopted a neutral stance.

A series of independent studies indicate that moving our clocks forward to continental time would result in:

- **Safer roads:** There would be a reduction of over 100 deaths and over 200 serious injuries each year by virtue of lighter evenings when there is a higher peak of road activity.

- **Reduction in NHS (A&E) budget:** Fewer accidents would result in around £200m savings by the NHS each year. This would also impact on insurance claims.

- **Reduction in crime:** More light later into the evening would result in reduced crime statistics across the nation, as most crime takes place under cover of darkness later in the day.

- **Improved health and wellbeing:** Increased opportunities for exposure to daylight (around 235 additional hours of after school and after work daylight a year), which would encourage more participation in outdoor activities and sports and help tackle the obesity time bomb.
• **Boost to UK tourism:** More daylight in the early evenings would deliver a boost to British tourism of an estimated £2.5bn per annum, with an increase in overall spending in the UK leisure sector of £3.5bn.

• **A reduction in energy bills:** More hours of available sunlight towards the end of the day would see about 5% reduction in energy bills across the UK as a whole.

• **A reduction in the UK’s carbon footprint:** The reduction in energy would also lead to about a 2.2% national reduction in CO₂ emissions during the winter months equating to 1.2m tonnes of CO₂; equivalent to removing 20,000 cars off the road for 6 months over winter.

• **Increased international business and trade:** One hour time difference with central Europe results in four hours loss of overlap in the working day. Changing the clocks would not only reconcile our time gap with Europe, it would help towards improving the overlap with the world’s biggest emerging markets, namely China and India.

The arguments for changing the clocks are more powerful than ever. It is hard to imagine a simpler, more cost effective piece of legislation which would dramatically change our way of life for the better.
2. The Big Idea

This policy proposal:

- would move the clocks forward by one hour in winter, resulting in GMT+1 and one hour in summer resulting in GMT+2;
- would be for an experimental period of three years;
- would affect the entire United Kingdom.

Simply put, this proposal would align our clocks with European Central Time and is referred to as Single Double Summer Time (SDST).

By illustration, Box 1 compares current sunrise and sunset times at different times of the year in Manchester (in grey) with the consequences of moving the clocks forward to SDST (in blue).

Box 1: Comparison of daylight hours in Manchester throughout the year

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 21st</td>
<td>08:23hrs</td>
</tr>
<tr>
<td>Mar 15th</td>
<td>06:23hrs</td>
</tr>
<tr>
<td>June 20th</td>
<td>04:39hrs</td>
</tr>
<tr>
<td>Sep 15th</td>
<td>06:43hrs</td>
</tr>
</tbody>
</table>
Changes to existing legislation:
The Directive on summer time arrangements was implemented in the UK under the *Summer Time Order 1994* (SI 1994/1357) which legally confirmed clocks move forward by one hour in March each year and move back by one hour in October.

In 1997 an EU Directive (97/44/EC) harmonised the onset and offset of summer time by obliging other EU Member States to synchronise their clock changes. This link to the European Directive was made permanent under the *Summer Time Order 2002* (SI 2002/262).

Possible amendment - balancing the time change:
As the table in Box 2 illustrates, clocks do not change symmetrically around the winter solstice. For example, last winter, clocks went forward 53 days before the shortest day of the year and back 101 days after the shortest day.

It is worth considering whether the clock changes could be balanced more evenly either side (around 75 days) of the shortest day in the year.

Efforts could also be made to synchronise clock changes with the United States. At present US clocks change two weeks earlier in March, and one week later in November, causing three weeks of stress for the travel and leisure industries as well as business commuters.
3. Impact on the UK

The expansion of the railway network in the late 1800s compelled the entire country to adopt the same synchronised time (as opposed to ‘local time’). This was measured from the Greenwich Observatory, giving rise to the now familiar name ‘Greenwich Mean Time’ (GMT).

- Using the Greenwich Meridian as a reference (0° Longitude) 24 time zones were created around the globe, each one covering exactly 15 degrees of longitude. However countries do not strictly follow this convention. Spain also sits on 0° Longitude but follows GMT+1, better known as Central European Time.

- The longitudinal implications for the UK mean with that with the sun approaching from the East, sunrise in Dover might take place at 07.14hrs but in St Ives it would not occur until 25 minutes later at 07.38hrs.

- The shape of the UK means this East-West phenomenon becomes less the further north your location, other than in Northern Ireland which is around 20 minutes behind the east coast of England.

- Situated so far north of the equator, the UK experiences changes throughout the day depending on one’s location, but they are not as dramatic as some commentators state. On the shortest day of the year for example, sunrise in The Shetland Islands takes place just 31 minutes after sunrise in St Ives.

Impact across England and Wales

The tables in Annex 1 illustrate the sunrise and sunset times in different bands across the length of England, as summarised in Box 3, at four different times of the year. As the tables suggest, moving the clocks forward simply swaps an hour of mostly ‘unused’ daylight in the morning during which the majority of the population are asleep, to the evening when the majority of the population are awake and active.

<table>
<thead>
<tr>
<th>Area</th>
<th>Difference in sunrise and set times across England and Wales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area 1</td>
<td>+11 mins</td>
</tr>
<tr>
<td>Area 2</td>
<td>+11 mins</td>
</tr>
<tr>
<td>Area 3</td>
<td>+11 mins</td>
</tr>
</tbody>
</table>

Box 4: Extra hours of daylight across England and Wales

<table>
<thead>
<tr>
<th>Location</th>
<th>Adults: Extra Hours</th>
<th>Children: Extra Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>299 hours (19.7%)</td>
<td>233 hours (11.9%)</td>
</tr>
<tr>
<td>Nottingham/Cardiff</td>
<td>302 hours (19.6%)</td>
<td>224 hours (11.4%)</td>
</tr>
<tr>
<td>Newcastle</td>
<td>297 hours (19.0%)</td>
<td>216 hours (11.1%)</td>
</tr>
</tbody>
</table>

London
Adults: 299 extra hours (19.7%)
Children: 233 extra hours (11.9%)

Nottingham/Cardiff
Adults: 302 extra hours (19.6%)
Children: 224 extra hours (11.4%)

Newcastle
Adults: 297 extra hours (19.0%)
Children: 216 extra hours (11.0%)
More hours of sunlight after work and school

- If we assume the typical working day for adults ends at 5.30pm the total number of extra daylight hours each year before sunset in Birmingham for example would be 301.

- If we assume the typical school day for children ends at 4pm the total number of extra daylight hours each year before sunset (or bedtime at 8.30pm – whichever is earlier) in Birmingham for example would be 224.

The impact on Scotland

Changing the clocks is understandably more sensitive in Scotland.

Press coverage to date would suggest the Scots have nothing to gain. This is simply not true.

As the sunset and sunrise tables for Scotland in Annex 2 show, its length and location in relation to the equator mean these times vary considerably the further north you travel. It therefore provides a more accurate picture to envisage the consequences of clock change in three sections:

Area 4: (Glasgow – Edinburgh) contains 4/5ths of the Scottish population. As Box 6 illustrates, moving the clocks would be beneficial to this area providing adults with an additional 175 hours of sunlight each year after work (taken to be at 5.30pm).

Children would benefit from 95 additional hours of sunlight a year from after school (taken to be 4pm) and before bedtime at 8.30pm.

Area 5: (Aberdeen) contains just 1/5th of the Scottish population. Box 6 illustrates, moving the clocks would also be beneficial to this area providing adults with an additional 159 hours of sunlight each year after work (taken to be at 5.30pm.)

Children would also benefit from 106 additional hours of sunlight each year after school (taken to be 4pm) and before bedtime at 8.30pm.
The trade-off with darker mornings would mean that the 17 days a year when sunrise is after the start of the working day would increase to 74 were the clocks to be moved.

**Area 6: (North Scotland)** conurbation contains just 1/10th of the population. As with the other two areas, moving the clocks would also be beneficial to this area providing adults with an additional 160 hours of sunlight each year after work (taken to be at 5.30pm.)

Children would also benefit from 84 additional hours of sunlight a year after school (taken to be 4pm) and before bedtime at 8.30pm.

In summary the vast majority of the Scottish population, particularly those in school or work, would benefit by moving the clocks forward to SDST. Were weekends to be included as well, adults in Scotland would enjoy around 161 hours EXTRA daylight and children around 195 hours.

**Impact in Northern Ireland**

- Situated around 7° degrees West of the Greenwich Meridian and on a parallel with Newcastle, sunrise lags behind London from between 5 minutes (winter solstice) and 45 minutes (summer solstice) throughout the year.
- Using the same method of calculations as above, changing the clocks would result in an extra 308 hours of daylight after work for adults and 208 hours of outdoor time for children after school but before bedtime or sunset, whichever is earlier.
- See Annex 3 for details of sunset and sunrise times throughout the year.
4. Safer Roads

As more journeys are made in the evening rush hour than the morning, a move to SDST would reduce overall road casualties across the UK.

Safer traffic movements – fewer injuries to children

- There are around 3 times more road casualties involving children in the evening rush hour compared to the morning rush hour, and around twice as many for adults.
- Most early morning car journeys involve the use of familiar roads such as the school run or driving to work. After-work journeys often involve trips on roads which drivers are less familiar with, increasing the chance of accidents, especially if it is dark.
- Road traffic is at its busiest between 3-6 pm and it is no surprise that the majority of accidents occur within this window. If we simply moved the clocks forward a greater portion of this time would be spent in daylight, and the risk of accidents would be reduced.
- Lighter evenings would mean a net reduction in injuries and deaths to school children. Home Office figures show two thirds of all injuries and deaths to school children take place in the early evenings on the roads.

1968-71 Experiment resulted in fewer road deaths and injuries

- During the 68-71 experiment with SDST, the Department for Transport Road and Research Laboratory (TRRL) calculated an 11% reduction in fatalities across England and Wales.
- TRRL stated that for the 1969-70 winter there were 1120 fewer killed or seriously injured and 2340 fewer injured. Its report stated the key groups who benefited were those aged 5-15, pedestrians and those living in Central England and Southern Scotland.

Safer roads in Scotland

- As there is far less car use and more dependence on walking in Scotland there is a 27% higher risk of a serious accident compared to England and Wales.
- Currently, in the winter months both journeys to and from school are often made in the dark. Were the clocks to be changed almost all school children in Scotland would be able to return home in daylight hours.
• For example, in Dundee, sunrise in late December takes place at 08.46hrs and sunset at 15.27hrs. With a clock change to 09.46 hrs and 16.27hrs the return journey will be in daylight.

• Scotland’s Transport Road and Research Laboratory (TRRL) stated that there was a reduction of 475 deaths and serious injuries in Scotland during the 1968-71 experiment broken down into the following areas:
  - Southern Scotland (pop: 4.0m) 25
  - Central Scotland (pop: 784,000) 350
  - Northern Scotland (pop: 316,000) 100

• A 2007 Cambridge University study on Daylight Saving independently calculated that had the 1968-71 clock change been made permanent, to date, around **3,500** deaths and serious injuries would have been prevented in Scotland.

### Box 7: Breakdown of TRRL analysis for reduction of casualties during the 1969-71 experiment

<table>
<thead>
<tr>
<th>Area</th>
<th>Killed or Seriously injured</th>
<th>All casualties</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE England</td>
<td>-339</td>
<td>-1006</td>
</tr>
<tr>
<td>SW England</td>
<td>-77</td>
<td>-225</td>
</tr>
<tr>
<td>Midlands</td>
<td>-342</td>
<td>-445</td>
</tr>
<tr>
<td>Wales</td>
<td>-51</td>
<td>-30</td>
</tr>
<tr>
<td>N England</td>
<td>-222</td>
<td>-251</td>
</tr>
<tr>
<td>S Scotland</td>
<td>-136</td>
<td>-333</td>
</tr>
<tr>
<td>N Scotland</td>
<td>29</td>
<td>-57</td>
</tr>
</tbody>
</table>
5. Reduction in Crime

Criminals are more active in the hours of darkness and far less crime takes place before sunrise than after sunset. Extending daylight hours to provide more light into the evenings will discourage criminal activity.

Reduction in Crime:

- The British Crime Survey (2006/7) states that three out of four acts of vandalism and vehicle related thefts occur during hours of darkness. The same goes for one out of every two burglaries and bike thefts.

- A 1995 Home Office Report stated that an extra hour of daylight in the evenings would lead to a 3% reduction in crime.

- Moving the clocks may not reduce all criminal activities – some of which could just as well take place an hour later, but it would reduce people’s fear of crime.

- Age UK state that elderly people would feel safer in the evenings and would no longer be confined to the effective ‘curfew’ brought on by the onset of darkness, at least until later in the evening.

- The Policy Studies Institute’s report on Daylight Saving has found that the majority of parents prevent children under the age of 15 from venturing outside the home when it gets dark.

- Older people also follow the same pattern of behaviour, ending outdoor activities such as shopping and gardening for fear of criminal activity.

Scotland:

- According to the Home Office’s British Crime Survey, Scotland too would benefit from a 3% reduction in vandalism and petty theft.
6. **Schools, Health and Well-Being**

People are happier and more energetic in the longer brighter days of summer. Conversely, mood and spirit declines and sick rates increase during the shorter, duller days.

On average we enjoy around four hours of spare time a day when we are not working, travelling to work or sleeping. Yet three of these ‘free hours’ are experienced after sunset.

As the calculations in chapter 3 and box 8 show, moving the clocks forward would provide around 235 hours of sunlight a year during this ‘free time’.

**Improved health and well-being**

- Changing the clocks would increase opportunities for exposure to daylight beyond the working day. It would encourage outdoor activity, even in winter, which would lead to improvement in health and well-being.
- The Sports Council has indicated strong support for the introduction of daylight saving time which would bring greater opportunities for participation in a wide variety of sports.
- The fact that we spend around 60% more time watching television in winter than in summer suggests that darker evenings (and probably the drop in temperature) deter us from venturing outside. All age groups could therefore benefit from greater opportunities for outdoor activities if our evenings were to be lighter.
- Considering that half of the UK’s top ten adult recreational activities are daylight dependant (with gardening being the top!) there exists a significant will to spend time outdoors.
- Changing the clocks would also mean trading daylight from a colder time of the day in the morning to a marginally warmer period in the evening.

**Tackling obesity**

- Changing lifestyles, home distractions, reliance on cars and public transport and static work conditions have all contributed to Great Britain’s claim to having one of the highest obesity rates in Europe.
- In 2008, 24% of men and 25% of women were classified as clinically obese.
• Obesity causes 30,000 deaths a year, as well as a range of illnesses including hyperlipidaemia, high blood pressure, hyperinsulinaemia, a prevalence of Type II Diabetes, orthopaedic problems and liver failure.

• In 2007, the Government estimated the costs of obesity at £2.3bn per year. This figure equates to around 3% of the total budget of the NHS, which spends over £500m on treating the above-mentioned obesity related illnesses every year.

• By 2025 male obesity is predicated to rise to 41% and female obesity to rise to 36%.

• 50% of Scotland’s population is predicted to be clinically obese by 2050.

• The introduction of SDST will provide more scope for outdoor activities thereby providing significant additional opportunities to tackle obesity.

| Box 8: Additional daylight hours at selected times due to moving from Western European Time to Central European Time |
|---|---|---|
| 4-5pm | 5-6pm | 6-7pm |
| **Existing hours of daylight**          |          |          |
| London                                | 288       | 243       | 192       |
| Birmingham                            | 292       | 246       | 198       |
| Newcastle                             | 280       | 243       | 196       |
| Edinburgh                             | 282       | 245       | 200       |
| **Additional hours of daylight**      |          |          |          |
| London                                | 74        | 45        | 50        |
| Birmingham                            | 71        | 45        | 49        |
| Newcastle                             | 72        | 38        | 47        |
| Edinburgh                             | 70        | 37        | 45        |

**Impact on schools**

• The detrimental impact that moving the clocks might have on school children has long been seen as a critical plank to the argument against any change. A re-examination of the case suggests that this is not so.

• As the calculations in chapter 3 show, moving the clocks forward would provide around 235 hours of sunlight a year during this ‘free
time’. School children in London would enjoy 223 hours, Birmingham 224 hours and Newcastle 216 hours.

- Moving the clocks forward would oblige children to go to school in the dark during the winter months. Under the present timings, children go to school before sunrise and return after sunset. By altering the clocks at least the return journey (the most dangerous one) is made in daylight.

- The Government recommends children participate in at least one hour of physical activity each day. A switch to SDST would accommodate more physical activity within their daily lives.

- Educational bodies both in Scotland and England have expressed their agreement on the benefits that an extra hour of daylight would bring to the running of extra-curricular outdoor activities.

**Loss to Treasury from unnecessary A&E expenditure**

- The Policy Studies Institute report estimated that the NHS could make up to £200,000,000 in savings from a switch to SDST.

- The above mentioned report also found that the reduction in the number of accidents in Scotland could save the NHS an estimated £15m each year.

- The findings of an academic report published by Cambridge University concluded that the 37 years since the trial period have contributed to £7 billion of avoidable costs to the NHS.

- Simply by introducing SDST at zero cost this money could be saved and reinvested into the NHS.

**Scotland**

- Physical inactivity is a key contributing factor towards Scotland’s level of chronic illnesses, which ranks among the highest in Europe. A recent Scottish Government Review recommended measures to combat this problem by encouraging greater participation in outdoor activities. A poor level of health is also linked to low exposure to sunshine, a prime factor associated with vitamin D deficiency.
A clock change for Scotland would result in very late sunsets during the summer months with the potential difficulty of settling children to sleep in the evening. This is not the case in Scandinavia where exceptionally long light evenings occur.

Scottish educational bodies such as the Scottish Association of Schools and Colleges have acknowledged the benefits to after-school activity that changing the clocks would bring.

Data from the 1999 National Child Health Surveillance Programme indicated that 9% of children in the first year of primary school in Scotland were obese (BMI >95th percentile of UK 1990 reference data) and this had risen to 16% at age 15 years.
7. Tourism & Leisure

Tourism is Britain’s fifth biggest industry worth over £100bn a year but the sector is struggling to compete in a market which is becoming increasingly internationalised. Our slice of the global tourism market has shrunk. We now have a ‘tourism deficit’ whereby the number of British holiday makers going abroad is higher than the number of tourists coming to the UK.

Changing the clocks would extend the daily operational hours for the entire tourism industry, boosting overall spend by £3.5bn a year.

The tourism industry

- In 1997 Britain attracted 3.9% of the global tourism market but this has since decreased to 3.2%.
- In the same period, the size of the tourism deficit has increased from around £7bn to £20bn. Compare this figure to the situation enjoyed by the French, who have a surplus of £6bn.
- The summer months are naturally the most profitable for the tourism industry but a critical period in the calendar is the so-called ‘shoulder season’. Between March and April and September and October business becomes more challenging.
- The peak daily visitor period to attractions (both indoors and outdoors) is in the late afternoon and the onset of darkness coincides with the closure of most outdoor attractions.
- One in four Britons now take a domestic holiday in addition to a break abroad. This usually takes place in the spring or autumn when the length of day is shorter. Changing the clocks effectively extends the day, meaning that sunset in March and October would occur at around the same time as it presently does in April and September.
- Visitor attractions would also benefit from an extra hour of daylight. Leisure day visits make up about 50% of the tourism industry and can be constrained by the advent of darkness in February, March, October and November.

Impact on town centres

- For many, particularly the elderly, town centres become ‘no go areas’ after dark due to fear of the antisocial behaviour that has come to be associated with youth drinking. Feedback from the restaurant and pub trade confirms a significant change in clientele associated with the advent of darkness in the evenings.
Moving the clocks forward would provide an extra hour of daylight business for the service industry, widening the pool of potential clientele.

Unlike shop opening times, closing times are very much affected by the onset of darkness. Lighter evenings would see increased high street sales as shops would benefit from around 235 of extra daylight during the working week (see Chapter 3).

**Boost to the economy**

- Changing the clocks will not only provide greater scope for daylight dependant attractions such as visits to historic houses, castles and parks but also increased participation in camping and caravan holidays, and spectator sports. In essence it will expand what Britain has to offer, which in turn will mean more jobs and more revenue for Britain.

- The British Association of Leisure Parks, Piers and Attractions and the Tourism Alliance argue that moving the clocks forward would extend the tourist season across the entire country (including Scotland), boost UK’s inbound tourism industry by an estimated £1bn per annum and boost overall spend to the UK tourism sector by £3.5bn.

**Boost to Scottish tourism**

- Tourism accounts for 11% of Scotland’s GDP. If the benefits of the clock change for the whole of the UK would mean an increase in revenues of £3.5bn and generate 80,000 jobs - pro rata this would mean £300m and 7000 new jobs for Scotland.

- Tourism is critical to the Scottish economy all year round as the breakdown in numbers from Visit Scotland suggest:
  
  - January - March 17%
  - April - June 28%
  - July - September 36%
  - October - December 19%
The Scottish Farmers Union has withdrawn its long standing objections to changing the clocks. It now realises that the clock change would help many of their members who wish to diversify their business into tourism activities, such as offering B&B facilities.

The Scottish Tourism Industry recognises the importance of tourism and its potential to their economy. It therefore set an objective in 2005 to increase earnings by 50% by 2015.

Scotland is seeing an increased interest in outdoor pursuits such as walking, climbing and sailing. Lighter evenings would greatly assist the tourism industry and help Scotland meet its 50% growth target.
8. Lower Energy Use and CO₂ Emissions

The majority of our population gets up well after sunrise for about nine months of the year, but we go to bed long after sunset every day of the year. Failure to align our lives to take better advantage of the sun’s free light and heat source costs the nation and the individual.

Changing the clocks would lower the net electricity demand for every day of the year as less lighting is needed in homes, offices and industrial premises and demand in mornings would increase in winter months only.

UK energy requirements

- As Box 9 illustrates, UK power usage jumps considerably when comparing the fortnight before and after the clocks change.
- As Box 10 shows, energy demand is lower in the morning than in the afternoon and peaks in the early evening.
- To align the hours of sunlight with the hours when we are busiest would make more efficient use of the sun’s natural energy.
- Lighting accounts for 13% of all domestic electricity consumption and 30% of all office electricity consumption.
- Moving to darker evenings places around an extra 2.2% on electricity demand due to the busiest period of the day (late afternoon/early evening) being affected by the dark.
- The cost of street lighting would be unaffected as most lights are left on throughout the night.

| Box 9: Average power usage in periods before and after clock changes (in Megga Watts) |
|-----------------------------------------------|--|
| Fortnight before | 38,307 | 42,260 |
| Week before | 38,692 | 42,366 |
| Week after | 39,287 | 39,658 |
| Fortnight After | 39,897 | 39,575 |

| Index values (4 week average =100) |
|----------------------------------|--|
| Fortnight before | 98.1 | 103.2 |
| Week before | 99.1 | 103.4 |
| Week after | 100.6 | 96.8 |
| Fortnight After | 102.2 | 96.6 |
Meeting the UK’s energy needs

- The UK’s energy supply comes from a number of sources, many of which are CO₂ friendly such as nuclear (18%) or gas (18%). When extra demand is placed on the grid the UK can quickly import power from France as well as fire up coal fired power stations.

- The consequence of this increased energy use is two fold:
  - Firstly, it is costly to the taxpayer as the price of electricity in proportion to total energy needed is not linear;
  - Secondly, it is less efficient and damaging to the environment as old oil and coal power stations are fired up.

- Electricity is bought and sold by energy companies in spot prices for periods of half and one hour. During peak periods of energy use, the inefficient power stations brought on-line drive up the spot price.

- Reducing these peaks in demand, especially in the winter months, by moving the clocks therefore cuts prices by at least 5%.

- In the UK as a whole, winter months see soaring levels of fuel consumption. Consumption of electricity is 50% higher, and gas 400% higher, than in summer.

- There would be energy savings of 2.78 million MWhs per winter if the
UK stopped reverting to GMT over the 21 weeks of winter as it currently does.¹

Reduction in CO₂ emissions

- The UK’s energy requirement for the three years 2005 – 2007 was 963 terawatt hours. Had daylight saving been introduced over the same period, around 9 terawatt hours could have been saved.

- The UK has agreed to reduce its greenhouse gas emissions to 12.5% below the base year level over the period 2008-2012. This equates to 682.4 million tonnes of CO₂ over the period.

- It is difficult to calculate the reduction in CO₂ emissions that changing the clocks would bring due to the complicated nature in which energy is generated to meet demand (for example, easy to start, coal fired power stations which produce excessive CO₂ emissions, come online to meet peak demand). Conservative estimates suggest a reduction in CO₂ emissions by 1.2m tonnes during the six months of winter. This equates to 20,000 cars being removed from our roads for 6 months or negating the annual carbon pollution of approximately 100,000 people.

¹ Cambridge University researchers used complex regression analysis equations for these estimations. By aligning our waking hours with the hours of daylight and the warmer period of the day, peaks in demand for electricity would be reduced (so less power stations would be required to be ‘online’) meaning we would use less energy.

Scotland

- Although situated further north, the clock change would still be of net benefit to Scotland as more energy is consumed in the evenings than in the mornings and savings would be made on lighting and heating bills. This is reflected in box 11.

- As Scotland is a net recipient of power from England during peak hours, the energy bill for Scotland would be reduced by flattening the two daily peaks requiring less energy to be imported from England.

- Overall heating costs in the winter are unlikely to change but during the rest of the year costs would be expected to fall slightly due to the higher temperature of between 1 and 2 degrees.
Centre for Technical Management Cambridge University study calculated an overall reduction of 0.3% in electricity demand and a peak demand reduction of 3.4%, with greater savings expected in Scotland due to its northerly attitude.

**Box 11: Change in Energy requirements in Scotland at start of British Summer Time (30/3/08)**

<table>
<thead>
<tr>
<th>Period</th>
<th>Average Energy Requirement</th>
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<tr>
<td>Monday 24th – Friday 28th March</td>
<td>4.0 Terra Watts average per day</td>
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<tr>
<td>Monday 31st March – Friday 4th April</td>
<td>3.8 Terra Watts average per day</td>
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<tr>
<td>Change</td>
<td>0.2 Terra Watts</td>
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<td><strong>9.5% reduction</strong></td>
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9. Business and Overseas Trade

The original justification for moving the clocks forward in October was to assist UK farmers. However, the practices of much of the UK workforce have changed to an extent that this ritual is now a hindrance to British business as a whole.

Recognising the UK’s working patterns

- Although there are some trades such as the postal service which continue to appreciate the annual clock change, the typical working day for the majority of our citizens runs from 9am to 5pm and so the current clock movements provide little benefit to the employer or employee.

Changing attitudes of the farming industry

- The farming industry once argued that the early, extra light was needed in the morning so farmers could ensure that their produce stock arrived at the market in time.
- Many of the issues raised by farmers following the 1968-71 experiment with daylight saving are no longer relevant as farming techniques have evolved and equipment such as storage, refrigeration and artificial lighting have become cheaper and more accessible.
- Moving the clocks would have little or no impact on the farming industry (confirmed by the NFU) which has effectively turned into a 24 hour day industry and is no longer limited by daylight hours.
- Attitudes and interests have matured with some farmers welcoming an additional hour of daylight in the evening allowing crops to be managed when they are dry - away from the high dew point in the morning.

Impact on international business

- Internationally we are isolated from the enormous time block covering most of Europe so hampering communication.
- A clock difference of one hour between British and continental time results in a loss of four hours a day for companies doing business in Europe

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<th>Exports</th>
<th>Imports</th>
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<td>Canada</td>
<td>Japan</td>
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<tr>
<td>Other</td>
<td>Other</td>
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Box 12: UK Principal Trading Partners by percent

Source House of Commons Library
as one hour is lost in the morning and evening with different start and stop times and two hours are lost over the unsynchronised lunch period.

- Whilst an hour for companies doing business with the US would be lost, business hour alignment with Tokyo would increase to two hours in our mornings, much of China to three hours, and India to six hours.

- The current time difference also affects the smooth scheduling of internationally televised activities such as football games and cultural events.

- With over 60% of our exports and over 50% of our imports linked with Europe, aligning our work patterns with our continental trading partners makes commercial sense. (see Box 12).

**Travel to Europe**

- The airline industry states that the difference in time between the UK and the continent results in frequent misunderstandings and inconvenience as travel involves juggling timetables with different zones, despite 80% of air traffic from the UK staying within Europe.

- Some argue that our time difference with Europe is an advantage when travelling from the continent, but this is a double edged sword as on the return journey the hour is lost. This limits return journeys, for example:
  - The last train from London to Brussels departs at 19.34hrs arriving in Brussels at 22.33hrs
  - The last train from London to Paris departs at 20.05hrs arriving in Brussels at 23.26hrs

  Business functions in London are therefore difficult to attend unless combined with an overnight stay. By moving the clocks forward these trains could then depart an hour later.

**Scotland**

- Members of CBI Scotland and the Edinburgh Chamber of Trade and Commerce agreed that the time change would be of benefit to Scotland from a business perspective.

- Since the 1970s there has been a significant shift in the Scottish employment market away from agriculture to the service sector particularly catering, tourism and sports related industries. The Scottish Labour survey states that just 1 in 70 is now employed in the agriculture industry.
Conclusion

Sunlight brightens our day and our lives and lifts our spirits. It makes our world safer and happier. We should utilise this valuable resource to coincide with that period of the day when our complex modern world is at its busiest, and most dangerous.

By moving the clocks forward around 235 hours of extra daylight would be enjoyed by adults after work every year. For children, around 209 hours of daylight after school (but before bedtime) would be created.

As recent polls show, the extensive benefits that have been summarised in this publication are recognised by the majority of the British population as well as a growing number of businesses and organisations. These include Age UK, The Tourism Alliance, the AA, the Teachers’ Association, The Football Association, The Army Cadet Force and numerous local authorities, hospitals, and police forces across the country.

Compared to life under the last clock change experiment, our daily routines are better structured to take advantage of lighter evenings. We have also become more technologically adept and will thus be able to manage the added darkness of the mornings.

Historically, the loudest voices against moving the clocks have come from Scotland. The fresh evidence presented here in this paper has illustrated that organisations such as the Scottish NFU have adopted positions that are either neutral at worst and wholly supportive at best.

The arguments to retain the status quo in Scotland are weak, but the voices making those arguments tend to be loud. When quizzed, it is a combination of fear of the unknown and political self-preservation from the politicians in the very north of Scotland who stand in the way of change.

It is hoped this publication will go some way to dispel the myths which surround the debate about moving the clocks forward.

As Parliament yet again scrutinises the latest Private Member’s Bill on the subject, it is hoped that previous passion and prejudice will be replaced by common sense and reason – both on the green seats and in the media. This is not about synchronising our clocks with ‘Berlin’ in order to comply with yet another pointless European directive; it is about a three-year trial to test a practical, economical, cost effective and eco-friendly proposal.

Since the dawn of humanity we have endeavoured to illuminate our cave by torchlight, candlelight or electric light. It is all too easy to take sunlight for granted.
Acknowledgements

My warmest thanks go out to a number of people and organisations who have contributed generously in terms of both expertise and time.

The compilation of this report would not have been possible without John Lewis’s own personal dedication.

Colin Dawson and his colleagues at BALPPA have also been instrumental in mobilising support behind the cause, as has the Lighter Later campaign organised by the 10:10 group.

I owe particular gratitude to Mayer Hillman of the Policy Studies Institute at Westminster University, and Elizabeth Garnsey at Cambridge University for their most thorough research; and last but not least the House of Commons Library for their patience.

Finally, to my Parliamentary team, Katie Armitage, Libby Herbert, Steve Parselle, Joanna Richards and Tamsin Lee-Smith without whom this study could not have been completed.
Annex 1 – England and Wales

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year.

Area 1: London

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**Notes**

- Changing the clocks would provide:
  - An additional 18 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 14 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
  - At the height of winter, school children presently return home during the hours of darkness. Were the clocks to change, sunset would take place no earlier than around 5pm throughout the year.
  - If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 34 working days.

*Figures for this and all other Annexes were calculated using data taken from [www.sunrisesunsetmap.com](http://www.sunrisesunsetmap.com)*
Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year.

Area 2: **Nottingham and Cardiff**

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**Notes**

- Changing the clocks would provide:
  - An additional 25 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 20 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
  - At the height of winter, school children presently return home during the hours of darkness. Were the clocks to change, sunset would take place no earlier than around 5pm throughout the year.
  - If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 22 working days.
Annex 1 – England and Wales

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year.

Area 3: Newcastle

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<td>06:39hrs</td>
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Notes

- Changing the clocks would provide:
  - An additional 29 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 25 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
  - At the height of winter, school children presently go to and return home during the hours of darkness. Were the clocks to change, sunset would take place no earlier than around 5pm throughout the year.
  - If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 23 working days.
Annex 2 – Scotland

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year. Figures shown are for (Edinburgh – Glasgow’s times lag behind by around 4 minutes).

Area 4: Glasgow

Notes

- Around four fifths of the Scottish population live in the Edinburgh - Glasgow conurbation. Changing the clocks would provide:
  - An additional 175 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 95 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
- At the height of winter, school children presently go to school in the dark. For a longer period school children presently return home during the hours of dark as well. Were the clocks to change, sunset would take place no earlier than around 4.40pm throughout the year.
- If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 24 working days.
Annex 2 – Scotland

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year. (Figures shown are for Aberdeen – Inverness times lag behind by around 10 minutes).

Area 5: Aberdeen

Notes

- Around one fifth of the Scottish population live in the Aberdeen-Inverness conurbation. Changing the clocks would provide:
  - An additional 159 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 106 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
  - At the height of winter, school children presently go to school in the dark. For a longer period school children presently return home during the hours of dark as well. Were the clocks to change, sunset would take place no earlier than around 4.30pm throughout the year.
  - If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 19 working days.
Annex 2 – **Scotland**

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year.

**Area 6: Northern Scotland/Shetlands**

<table>
<thead>
<tr>
<th>Date</th>
<th>Sunrise (Hrs)</th>
<th>Sunset (Hrs)</th>
<th>Time Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 21st</td>
<td>08:57hrs</td>
<td>15:33hrs</td>
<td>6:36hrs</td>
</tr>
<tr>
<td>Mar 15th</td>
<td>06:32hrs</td>
<td>18:21hrs</td>
<td>11:49hrs</td>
</tr>
<tr>
<td>June 20th</td>
<td>04:18hrs</td>
<td>22:19hrs</td>
<td>18:01hrs</td>
</tr>
<tr>
<td>Sep 15th</td>
<td>06:48hrs</td>
<td>19:35hrs</td>
<td>12:47hrs</td>
</tr>
</tbody>
</table>

**Notes**

- Around one tenth of the Scottish population live in Northern Scotland and the Shetland Islands. Changing the clocks would provide:
  - An additional 160 hours of daylight time after work (taken to be 17.30hrs) but before sunset for the typical working adult.
  - An additional 84 hours of daylight time after school (taken to be 16.00hrs) but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
  - At the height of winter, school children presently go to school in the dark. For a longer period school children presently return home during the hours of dark as well. Were the clocks to change, sunset would take place no earlier than around 4.00pm throughout the year.
  - If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean a loss of 19 working days.
Annex 3 – Belfast, Northern Ireland

Comparison of current sunrise and sunset times for 2009/2010 (in grey) with sunrise and sunset times were the clocks to be moved forward (blue) on four dates throughout the year.

Area 1: Belfast, Northern Ireland

Notes

- Changing the clocks would provide:
  - An additional 308 hours of daylight time after work but before sunset for the typical working adult.
  - An additional 208 hours of daylight time after school but before bedtime (taken to be 20.30hrs) or sunset, whichever is later.
- At the height of winter, school children presently go to school in the dark. For a longer period school children presently return home during the hours of dark as well. Were the clocks to change, sunset would take place no earlier than around 4.00pm throughout the year.
- If the period between 08.30hrs and 09.00hrs is taken as key travel time to school or work where daylight is appreciated, the clock change would mean around a loss of 23 working days.
Annex 4 – History of Daylight Saving

- Altering working day patterns to match sunlight hours was common practice in the ancient civilizations. For example, the Romans used water clocks with varying weights for different months to synchronize the beginning of the working day with sunrise.

- In 1784, Benjamin Franklin, as American Envoy to France, suggested Parisians should economise on candles by rising earlier to use the morning sunlight. He later wrote the proverb, “Early to bed, and early to rise, makes a man healthy, wealthy and wise”.

- The practice of temporarily shifting the clocks was first proposed in 1895 by the astronomer George Vernon Hudson in New Zealand who, whilst collecting insects as a pastime, appreciated the value of daylight during the working day.

- In 1907 the English builder and golfer William Willett, concerned that too many people slept through a sizeable part of the sunlit day, published the pamphlet “The Waste of Daylight” where he proposed advancing the clocks during the summer months.

- In 1908 Robert Pearce MP used Willett’s idea to propose the first Daylight Saving Bill to the House of Commons. This, and subsequent Daylight Saving Bills, failed to become law.

- In April 1916, however, during the height of the First World War Germany introduced an hour clock change ‘Sommerzeit’ in an effort to conserve coal during wartime. Britain and other countries across Europe as well as the US followed suit. In Britain the clocks moving one hour forward from 21st May to 1st October proved very popular and the concept has remained unchanged to this day although there have been periods such as during the Second World War when more substantial clock shifts were temporarily introduced to help conserve energy and maximise outdoor work out before the nightly bombing raids commenced.

- From 1968 to 1971 the United Kingdom experimented with year-round double summer time but MPs voted against permanently continuing the practice. This is despite polling evidence read out by the then Home Secretary, Reginald Maudling, that showed 50% in favour of the experiment versus 41% against.
• Over the last two decades there has been a series of attempts by Backbench MPs and Peers to alter the clocks, either in England or the UK as a whole but none have had serious backing by the Government of the day.

• Since 1996 European Summer Time has been observed from the last Sunday in March to the last Sunday in October; previously the rules were not uniform across the European Union.

• In 2007 the US and Canada altered their clock change days to the second Sunday in March and the first Sunday in November, almost two-thirds of the year putting the clock change at odds with Europe.
About the Author

Tobias was born in New York, USA (due to his parents’ overseas posting at the time). He grew up in Bonn, Germany and Vienna, Austria, but returned to the UK to complete his first degree at Loughborough University. Whilst at Loughborough Tobias was elected President of the Students’ Union.

He spent five years in the Army with The Royal Green Jackets, head quartered in Winchester and served in Northern Ireland, Cyprus, Kuwait, Germany, Gibraltar and Bosnia.

On leaving the army Tobias worked as a researcher for the former Defence Secretary, the Rt Hon Tom King. He returned to university to complete an MBA at City University Business School. Tobias then moved to the London Stock Exchange for two years where he was a Senior Business Development Manager and, following that, to a similar role for the law firm Allen and Overy.

Tobias was elected as Member of Parliament for Bournemouth East in May 2005. In January 2006 he was appointed Opposition Whip and in July 2007 was promoted to the post of Shadow Minister for Tourism during which time he conducted a comprehensive survey of the impact changing the clocks might have on the whole of the UK, visiting every region to meet voices for and against the proposal.

After the May 2010 General Election Tobias was appointed Parliamentary Private Secretary to the Defence Secretary, Rt Hon Liam Fox. Tobias completed the senior executive course in National and International Studies at the Kennedy School of Government, Harvard University in the summer of 2009.

Tobias is married to Hannah and they have a son, Alexander, who was born in October 2008.
Sunlight brightens our day, our lives and our spirits. It makes our world safer and happier. We should utilise this valuable resource to coincide with that period of the day when our complex modern world is at its busiest, and most dangerous.